THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY

COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY

Dissertation submitted in partial fulfillment of the requirements for the degree of

M.Ch. Branch –II NEUROSURGERY

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INSTITUTE OF NEUROLOGY

MADRAS MEDICAL COLLEGE

CHENNAI – 3.

CERTIFICATE

This is to certify that the dissertation entitled **"COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY"** was done under our supervision and is the bonafide work of **Dr.C.Kathirvel**. It is submitted in partial fulfillment of the requirement for the M.Ch (Neurosurgery) examination.

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DECLARATION

I SOLEMNLY DECLARE THAT THE DISSERTATION TITLED **"COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY"** HAS BEEN PREPARED BY ME IN THE INSTITUTE OF NEUROLOGY, MADRAS MEDICAL COLLEGE, RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI AND IS SUBMITTED TO THE TAMILNADU DR.MG.R.MEDICAL UNIVERSITY IN PARTIAL FULFILLMENT OF RULES AND REGULATIONS FOR THE M.CH NEUROSURGERY DEGREE EXAMINATION.

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CONTENTS

INTRODUCTION

INTRODUCTION

Disturbances in the blood coagulation mechanism are very much relevant in patients with severe head injury. In patients with traumatic brain injury based on the nature and type of the force, the brain parenchyma sustains injury and develops various lesions. Development of multiple small haemorrhages in the brain parenchyma activates the coagulation mechanism and a normal balance in the coagulation mechanism is needed to arrest the enlargement of the small lesion into larger one.

Intra cranial Haemorrhage is the most important factor that determines the outcome of the patient with traumatic brain injury and is the leading cause of the death in severe head injury patients.[29] Coagulation disturbances resulting from the traumatic brain injury leads to further secondary injury.

Disturbance in the coagulation cascade mechanism is a complex one in Traumatic Brain Injury patients and that lead to coagulopathy, hypercoagulability or combination of both resulting in further secondary injury.

Coagulation disturbance in Traumatic Brain Injury leads to depletion of clotting factors and decrease in platelet level causing coagulopathy which is aggravated by metabolic disturbances such as acidosis, decrease or increase in the body temperature and hypovolemia of the patient with TBI. This coagulation mechanism derangement causes bleeding and increases in the size of the haemorrhage as well as ischaemia.[6]

In Hypercoagulability, increased fibrin formation occurs in the blood vessels. The deposition of fibrin is generalized in the circulatory system in disseminated intravascular coagulation (DIC) cases or localized with formation of small clots in the vicinity of a contusion.

Pathophysiology in DIC leads to widespread coagulation disturbance, which results in fibrin deposition in the blood vessel and thrombotic occlusion of vessels.[20,21] Occurrence of coagulation derangements in traumatic brain injury is associated with poor outcome.[25] Derangement in the coagulation mechanism needs to be identified in the early stage and should be treated promptly to prevent poorer outcome.

AIM OF THE STUDY

AIM OF THE STUDY

1. To analyze the coagulation factors profile in acute severe head injury.

2. To identify the risk factors associated with coagulation

REVIEW OF LITERATURE

REVIEW OF LITERATURE

In normal persons, to maintain homeostasis, the haemostatic mechanism balances between formation of clots and lysis of clots called as coagulation and fibrinolysis respectively.[4] In patients with severe head injury this haemostatic mechanism is disturbed leading to either excessive clot formation and or abnormalities in the fibrinolytic mechanism .[16]

The derangement in the coagulation pattern is different in patients having head injury and in patients having polytrauma. Damaged brain tissue is the main source of initiation and activation of coagulation pathway and lots studies proved this fact beyond doubt.

Damaged brain tissue releases protein substrates which are hypothesized to be the main reason for initiation of coagulation mechanism. Later this protein molecule was identified and called as "Tissue Factor". Since this protein molecule was found abundantly in the platelets it was also named as thromboplastin or thrombokinase or platelet tissue factor[3] or Factor III or CD 142. This factor also found in the leukocyte and subendothelial tissue of the blood vessels. Prothrombin is an inactive substance also called as zymogen which is converted into its active form thrombin by the Tissue

factor and thus the Tissue Factor plays the main role in the initiation of the coagulation mechanism.

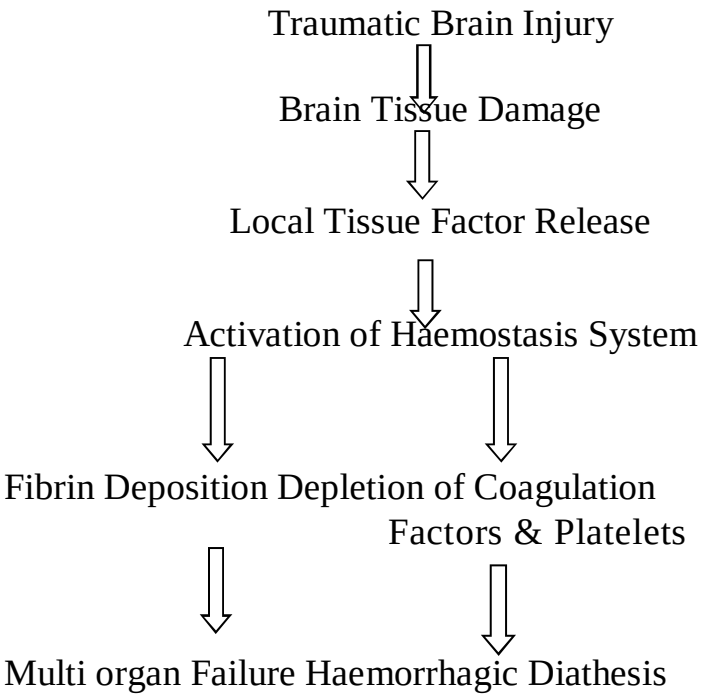
Release of the platelet tissue factor or Factor III or CD 142 from the damaged brain tissue in patients with Traumatic Brain Injury excessively activates the coagulation mechanism. This causes secondary injury to the brain. More severe the brain injury, more damage to the brain parenchyma and extensive release of Tissue Factor that determines the severity of the coagulation disturbance.

Recently, Gando and colleagues[12] stated that in patients with traumatic brain injury, tissue factor level in their circulation is very high compared to the non traumatic brain injury patients. Pathak and colleagues in their study[27] found that the results of Gando and colleagues is reproducible[12] and severe head injury patients have high levels of platelet tissue factor or Factor III or CD 142 in their circulation compared to non head injury patients. This shows the importance of Tissue Factor role in coagulation mechanism derangement in head injury patients.

From the damaged brain, tissue factor is released. This factor causes activation of the Extrinsic Pathway of the coagulation mechanism.[22] In the extrinsic pathway, factor VII becomes activated and this activated Factor VII (VIIa) binds with the tissue factor. This factor VIIa – TF complex activates factor X and IX. VIIa – TF complex converts inactive factor IX to IXa (activated IX) and this IXa converts factor X in to Xa with help of Calcium, VIIIa and Phospholipid. Xa in turn with help of Va, Calcium and Phospholipid converts Prothrombin into Thrombin.

Thrombin converts Fibrinogen in to Fibrin monomer and also converts factor XIII into its active form XIIIa. Activated factor XIII converts fibrin monomer into fibrin polymer. Above said cascade occurs on the platelet surface which forms a good platform for all these reactions. Formed fibrin polymer binds with platelets and form the thrombus which leads to occlusion small as well as large blood vessels. In patients with TBI brain parenchymal damage leads to excessive release of tissue factor which causes extensive formation of clots leads to loss of coagulation factors as well as decrease in

the number of platelets leading excessive bleeding at one stage. This path way is called EXTRINSIC PATHWAY in the coagulation mechanism[4,8] (4, 8).



Control mechanisms to check the initiated coagulation mechanism are Tissue Factor Pathway Inhibitor (TFPI), Antithrombin system, the protein C system and glycosaminoglycans.[9,11,14] These factors are responsible to counter excessive fibrin formation and are responsible for the fibrin localization occurs in the damaged brain parenchyma.

The above mentioned control mechanism factors comes in to play in traumatic brain injury but these factor are unable to check the over activation of the coagulation mechanism when the injury is severe and abundant amounts of Tissue Factor released. Disseminated Intravascular Coagulation caused by extensive tissue factor activation, inhibits the antithrombotic

mechanisms through various mechanism such as cytokine release and up regulation of thrombotic factors leading to defective physiological anticoagulation pathways. Multi organ failure (MOF) occurs because of the over activation of coagulation mechanism which is responsible for occlusion of blood vessel and excessive bleeding leading to necrosis and haemorrhage in the various organs. Various clinical data confirmed these findings and extrapolated these into poor outcome for the patients with traumatic brain injury.[20,21]

The tissue factor or extrinsic pathway of the coagulation mechanism is measured by the prothrombin time and its normal reference value is between 12 to 14 seconds.[33] Prothrombin time measured values may also be reported as INR (International Normalised Ratio) and its normal value is 1.0.

The **activated partial thromboplastin time** (**aPTT** or **APTT**) measures both intrinsic and common coagulation pathways. The normal reference value is between 25 to 39 seconds (depending on laboratory). Normal PTT times indicate that the following coagulation factors are present in adequate level: I, II, V, VIII, IX, X, XI, & XII. Factors VII or XIII levels cannot be assessed by the PTT test.

The normal physiological range for platelets is $(150 – 400) \times 10^3$ per mm^3.[32] Hemostasis is the most important function of platelets .Whenever there is damage to endothelium of blood vessels occurs, platelets comes in to play with the coagulation mechanism to form the thrombus and achieves the hemostasis. Bleeding time and the clotting time indirectly measures the platelet function. Normal value of bleeding time is 2 to 5 minutes when using Dukes method.

Normal value of clotting time is 5 to 8 minutes when using capillary tube method. In cases of DIC, examination of peripheral blood smear shows combination of fragments of RBCs (schistocytes), thrombocytopenia and leukocytosis with left shift [32].

Coagulation abnormalities in the severe head injury patients are responsible for delayed bleeding in the brain parenchyma as evidenced by the appearance of new haematoma or enlargement of already existing lesion. This fact is confirmed by many clinical studies [6,8] (6, 8). Hence prevention of the development of new haematoma or enlargement of already existing lesion in traumatic brain injury patients would be the challenging task in their management.

In severe Traumatic Brain Injury patients, the attention to the diagnosis of coagulation mechanism derangement and management of the derangement and its complication has lots of controversies. Treating the patients with TBI when they suspected to have developed coagulopathy should begin in the early stage to prevent and to arrest the secondary and delayed injury to the brain to avoid a poor outcome.

Patient's clinical condition assessed by GCS scale.

SCORING SYSTEM OF THE GLASGOW COMA SCALE

EYE OPENING (E)

Spontaneous 4 Open

to voice 3 Open to pain

2 None 1

BEST MOTOR RESPONSE (M)

Following commands 6

Localizing to painful stimulus 5 Flexion-withdrawal

to painful stimulus 4 Flexor/decorticate posturing to

painful stimulus 3 Extensor/decerebrate posturing to painful

stimulus 2 None 1

BEST VERBAL RESPONSE (V)

Oriented conversation 5 Confused/disoriented

conversation 4 Inappropriate words 3

Incomprehensible sounds 2 None

1 MAXIMUM SCORE (E + M + V) 15

MINIMUM SCORE 3

MATERIALS AND METHODS

MATERIAL AND METHODS

This is a prospective study of 250 cases of acute severe head injury patients admitted and treated at RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, Chennai, one of the most renowned hospitals in India and our neurosurgical department MADRAS INSTITUTE OF NEUROLOGY is one of the pioneers in the establishment of neurosurgical Centre in our nation.

All head injury cases were examined immediately by the duty neurosurgery residents and by the duty assistant neurosurgeon who gives 24 hour round the clock trauma care to Neuro trauma patients.

All the head injury patients are clinically assessed by ABCD method and specifically clinical and neurological status are assessed by applying GCS score. The vital parameters are closely monitored and after hemodynamic stability patient immediately shifted to CT (computed tomography) brain scan.

Following factors are examined,

1. Detailed History
2. Clinical Examination
3. Haematological Evaluation

   i .Prothrombin time

   ii . Activated Partial Thromboplastin Time

   iii . International Normalised Ratio

   iv . Bleeding Time

   v . Clotting Time

   vi . Platelet Count 4.

   CT Scan

5. Analysis of the data

Acute severe head injury patients with GCS score of 8 and less than 8 irrespective of age, mode of injury are included in the study.

- Any pre existing coagulation disorder,
- On anticoagulation therapy,
- GCS > 8,
- Polytrauma are excluded from the study.

1. Detailed History

Injury time and admission date and time of the patient is noted. Mode of the injury is very much important in relation to the occurrence of type of brain injury.

Critical components include the nature of the force (contact or loading), the type of injury (rotational, translational, or angular),and the magnitude and duration of the impact .[28]

Contact forces occur when the head is prevented from moving after impact. Inertial forces occur upon acceleration or deceleration of the head, resulting in differential motion of the brain relative to the skull. Although one process may predominate, most patients with TBI experiences combination of these mechanisms.

2. Clinical Examination

Clinical condition and level of consciousness after TBI are typically described using the Glasgow Coma Scale.

Pupillary reaction to light, Doll's Eye Movement, pulse rate, blood pressure, respiratory rate and its pattern are noted and documented.

Any other associated injuries are noted and poly trauma patients are excluded from the study as presence of long bone or pelvic bone fractures itself may contribute to coagulation disturbance by causing fat embolism.

3. Haematological Evaluation

Prothrombin time, activated Partial Thromboplastin Time, International Normalised Ratio, Bleeding Time, Clotting Time, and Platelet Count are measured. Above mentioned factors were estimated in blood samples of the study population analyzed in Day 1, 3, 5, 7 and Day 9(if needed) of the injury patients.

Patients with TBI having Prothrombin time more than 18 seconds, activated Partial Thromboplastin Time more than 40 seconds, International Normalised Ratio more than 1.4, and Platelet Count less than 1 lakh or significant drop in values in relation to the first value are considered to be having coagulation disturbance.

If coagulation disturbance was present haematological evaluation were done according to the need of the patient. The measurement of Prothromin Time and International Normalized Ratio reflects the status of extrinsic pathway or factor VII pathway or Tissue factor pathway.

The value of International Normalized Ratio when it is more than 1.4 is clinically significant and that cautions against the development of generalized bleeding. INR more than 1.4 with an elevated aPTT is more relevant clinically than INR alone.

The aPTT measures various steps in the coagulation mechanism and its elevated abnormal values signify derangement of coagulation mechanism in multiple levels and more severe pathology in the coagulation pathway. aPTTs value of more than 1.8 times the lab reference control value is more significant and associated with haemorrhagic tendencies which was confirmed in various clinical studies.

When abnormal activation of coagulation pathway occurs in patients with TBI, more fibrin formed from fibrinogen through extrinsic pathway mechanism and the check mechanism initiates fibrinolytic pathway leading to degradation of fibrin. Because of excessive activation, fibrinogen levels rapidly decline and when the fibrinogen level goes under 50 mg/dL haemorrhagic tendency occur in the patients. So assessment of Fibrinogen level and Fibrin degradation product d-dimer level are important in the analysis of coagulation factor assays.

Fibrin clot formation determines the values of the Prothromin Time and International Normalized and activated PTT. Fibrinogen levels less then 80mg/dl associated with prolonged Prothromin Time and International Normalized Ratio and activated PTT. So Fibrinogen level status can be assessed by measuring Prothromin Time and International Normalized Ratio and activated PTT.

4. CT Scan

Contusions, Fracture, Diffuse axonal injury, Epidural haematoma, subdural haematoma, subarachnoid haemorrhage were assessed by taking plain axial CT scan brain. Follow up scans were taken as required to the need of the patient management.

Patients were analyzed as per the Proforma enclosed and the collected data were analyzed.

RESULTS

RESULTS

The analysis of factors influencing the coagulation factors in acute severe head injury was done using various statistical methods like frequency table, cross tabulation, chi-square test, Fisher's exact test and risk estimate by odds ratio.

The outcome was analyzed in terms of presence or absence of coagulation derangement in patients having

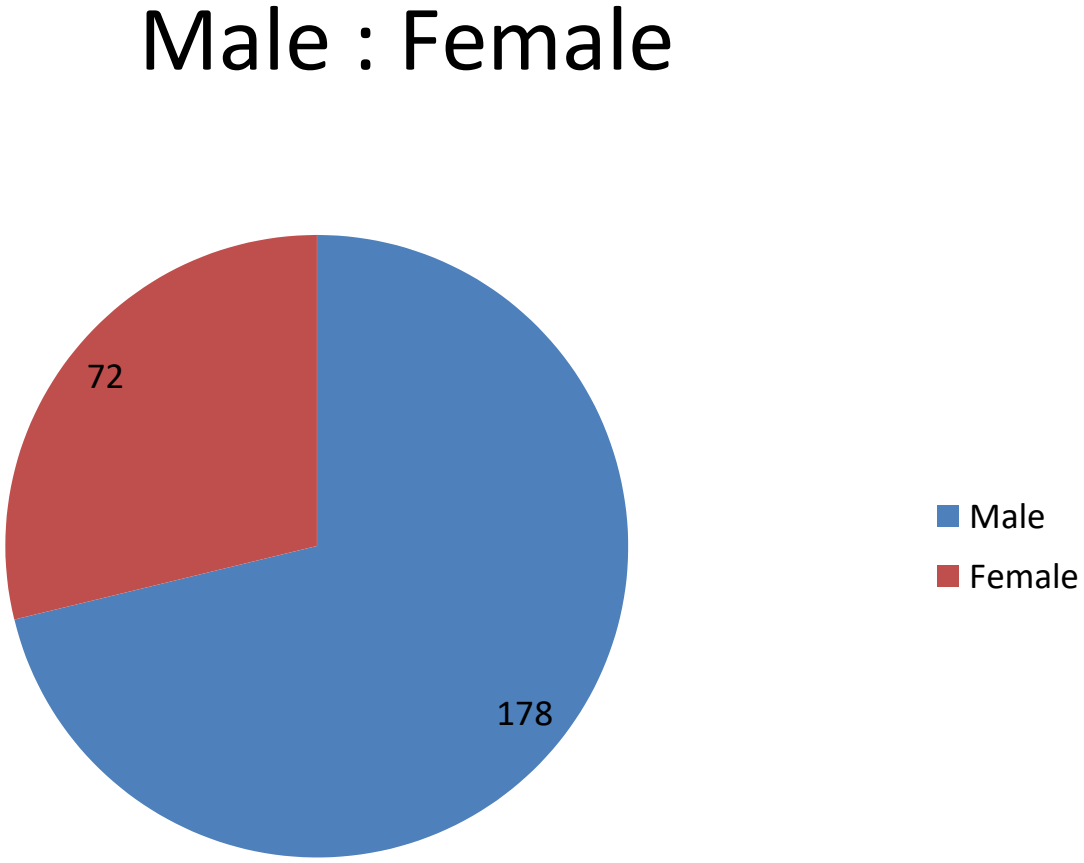
i. SDH

ii. SAH

iii. EDH

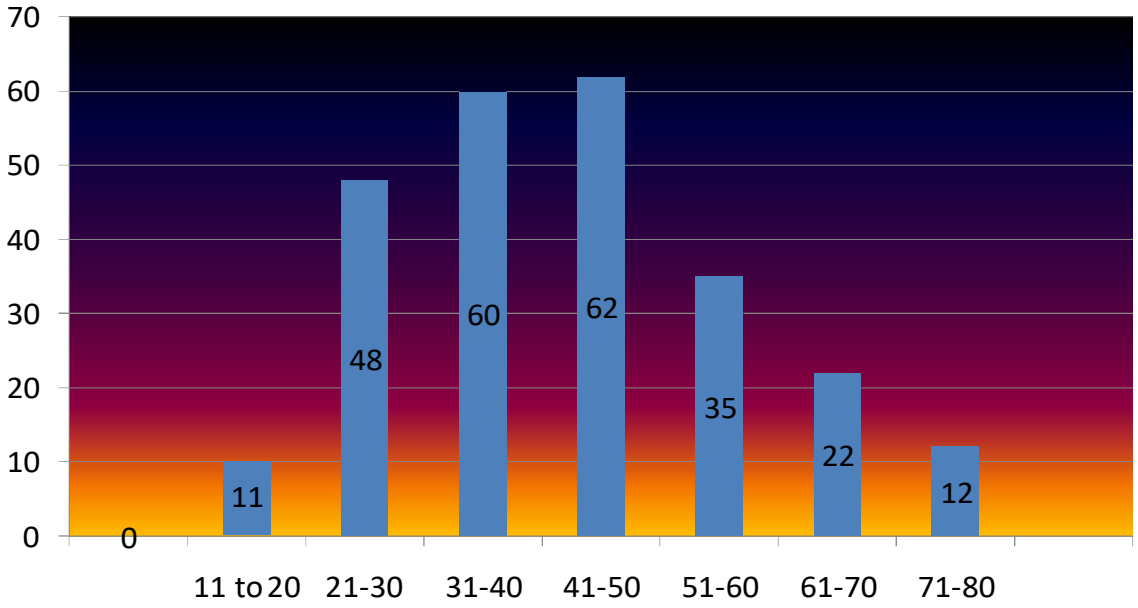
iv. Contusion or

v. Diffuse Axonal Injury or various combination of above findings.



Of the 250 patients, 178 were male and 72 were female patients. In male and female patients, most of them had head injury because of high velocity road traffic accidents.

AGE



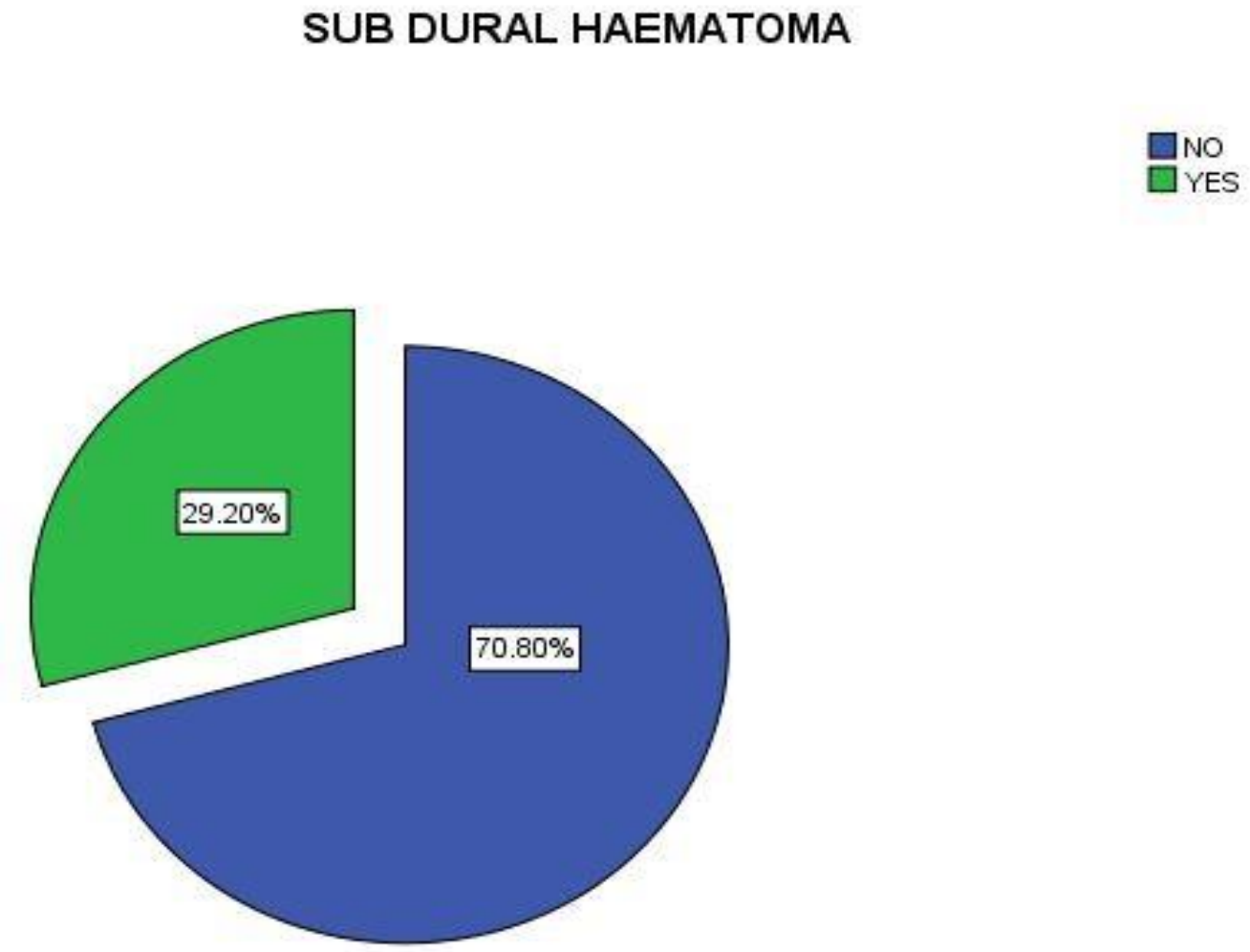
Patients in the age group of 21 to 50 constitute major part of the study population. In that 31 to 50 age group contributes 142 patients and 21 to 30 about 48 patients.

FREQUENCY TABLE - 1

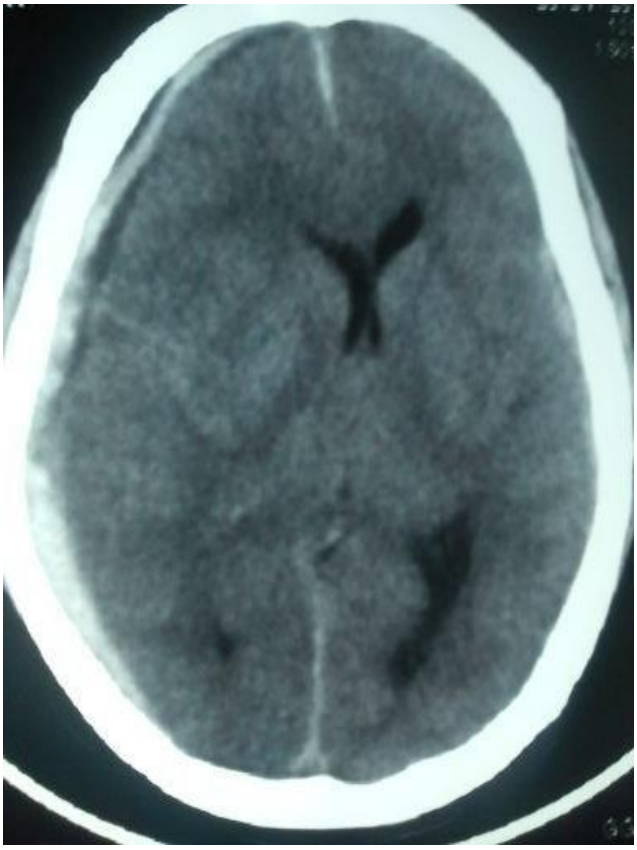
SUB DURAL HAEMATOMA

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	No (absent)	177	70.8	70.8	70.8
	YES (present)	73	29.2	29.2	100.0
	Total	250	100.0	100.0	

The above Frequency Table shows that out of 250 patients 73 patients are having SDH with a valid percent of 29.2%



The pie chart shows that 29.2% of total study patients had acute SDH.



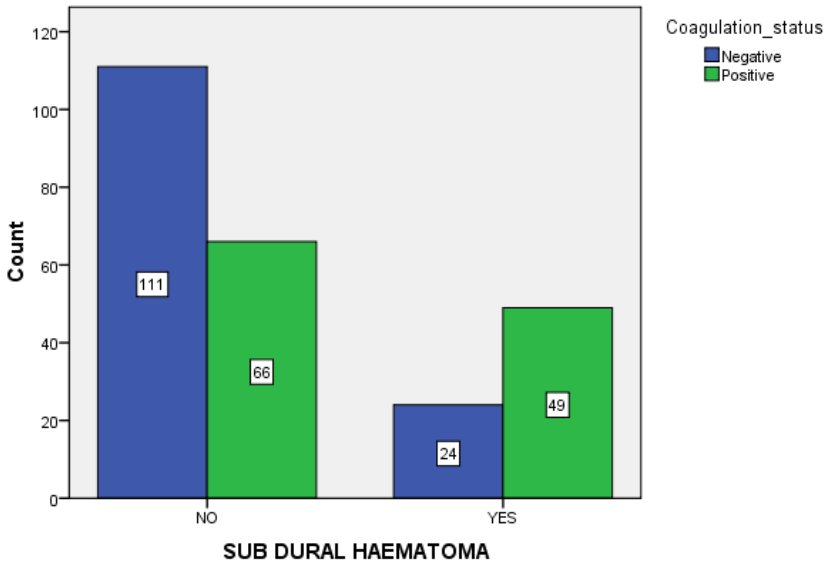
Pic. 1. Right FTP acute SDH with midline shift.

In patients having SDH, coagulation disturbance result is assessed by cross tabulation , Pearson Chi-Square and Fisher's Exact Test and the following tables show the results

CROSSTAB - 2

SUB DURAL HAEMATOMA * COAGULATION STATUS CROSS TABULATION

			Coagulation status		
			Negative	Positive	Total
SUB DURAL HAEMATOMA	NO	Count	111	66	177
		% within SUB DURAL HAEMATOMA	62.7%	37.3%	100.0%
	YES	Count	24	49	73
		% within SUB DURAL HAEMATOMA	32.9%	67.1%	100.0%
	Total	Count	135	115	250
		% within SUB DURAL HAEMATOMA	54.0%	46.0%	100.0%



CHI-SQUARE TESTS FOR SDH TABLE - 3

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18.521a	1	.001		
Continuity Correction	17.339	1	.001		
Likelihood Ratio	18.703	1	.001		
Fisher's Exact Test				.001	.001
N of Valid Cases	250				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 33.58.

b. Computed only for a 2x2 table

In the Pearson Chi-Square test, the test value is less than .005 and is statistically significant for the occurrence of coagulation disturbance.

RISK ESTIMATE OF SDH – TABLE - 4

		95% Confidence Interval	
	Value	Lower	Upper
Odds Ratio for SUB DURAL HAEMATOMA (NO / YES)	3.434	1.931	6.106
For cohort Coagulation status = Negative	1.907	1.348	2.698
For cohort Coagulation status = Positive	.556	.433	.713
N of Valid Cases	250		

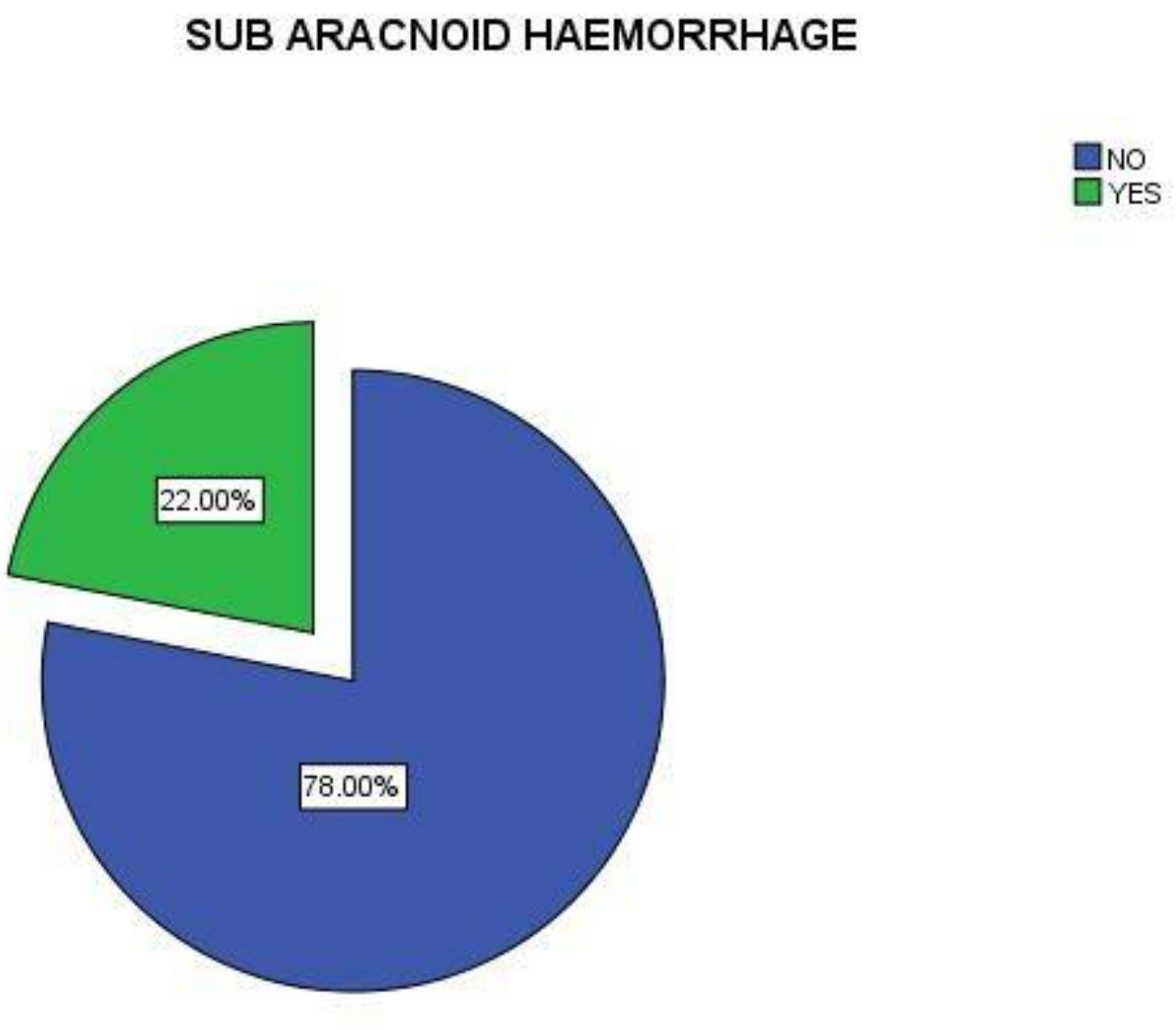
The Odds of developing coagulation disturbance in patients with severe TBI having acute SDH is 3.434

SUB ARACHNOID HAEMORRHAGE – TABLE – 5

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	NO	195	78.0	78.0	78.0
	YES	55	22.0	22.0	100.0
	Total	250	100.0	100.0	

In cases of subarachnoid haemorrhage frequency table shows valid percent as 22.0%

Pic. 2. Diffuse SAH left and right fronto parietal region.

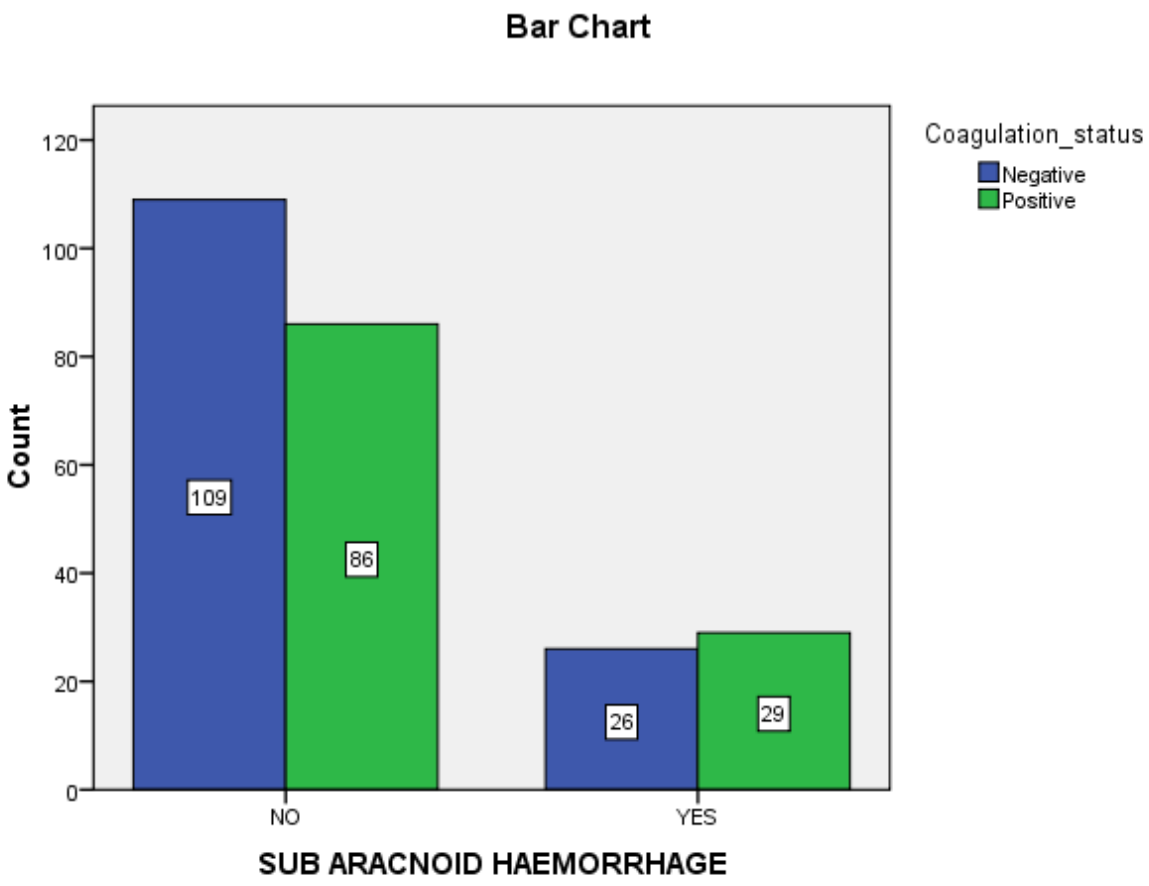


Pie chart depicts that 22% of study population has SAH

CROSSTABS - 6

SUB ARACHNOID HAEMORRHAGE * COAGULATION STATUS CROSS TABULATION

			Coagulation status		
			Negative	Positive	Total
SUB ARACNOID HAE MORRHAGE	NO	Count	109	86	195
		% within SUB ARACHNOID HAEMORRHAGE	55.9%	44.1%	100.0 %
	YES	Count	26	29	55
		% within SUB ARACHNOID HAEMORRHAGE	47.3%	52.7%	100.0 %
	Total	Count	135	115	250
		% within SUB ARACHNOID HAEMORRHAGE	54.0%	46.0%	100.0 %



The above cross tabulation and Bar Chart show that 29 05 55 patients who had SAH developed coagulopathy.

CHI-SQUARE TESTS FOR SAH – TABLE 7

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.285a	1	.257		
Continuity Correctionb	.961	1	.327		
Likelihood Ratio	1.281	1	.258		
Fisher's Exact Test				.285	.163
N of Valid Cases	250				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 25.30.

b. Computed only for a 2x2 table

The test value for occurrence of coagulation disturbance in patients with subarachnoid haemorrhage is more than .005 and is statistically not significant.

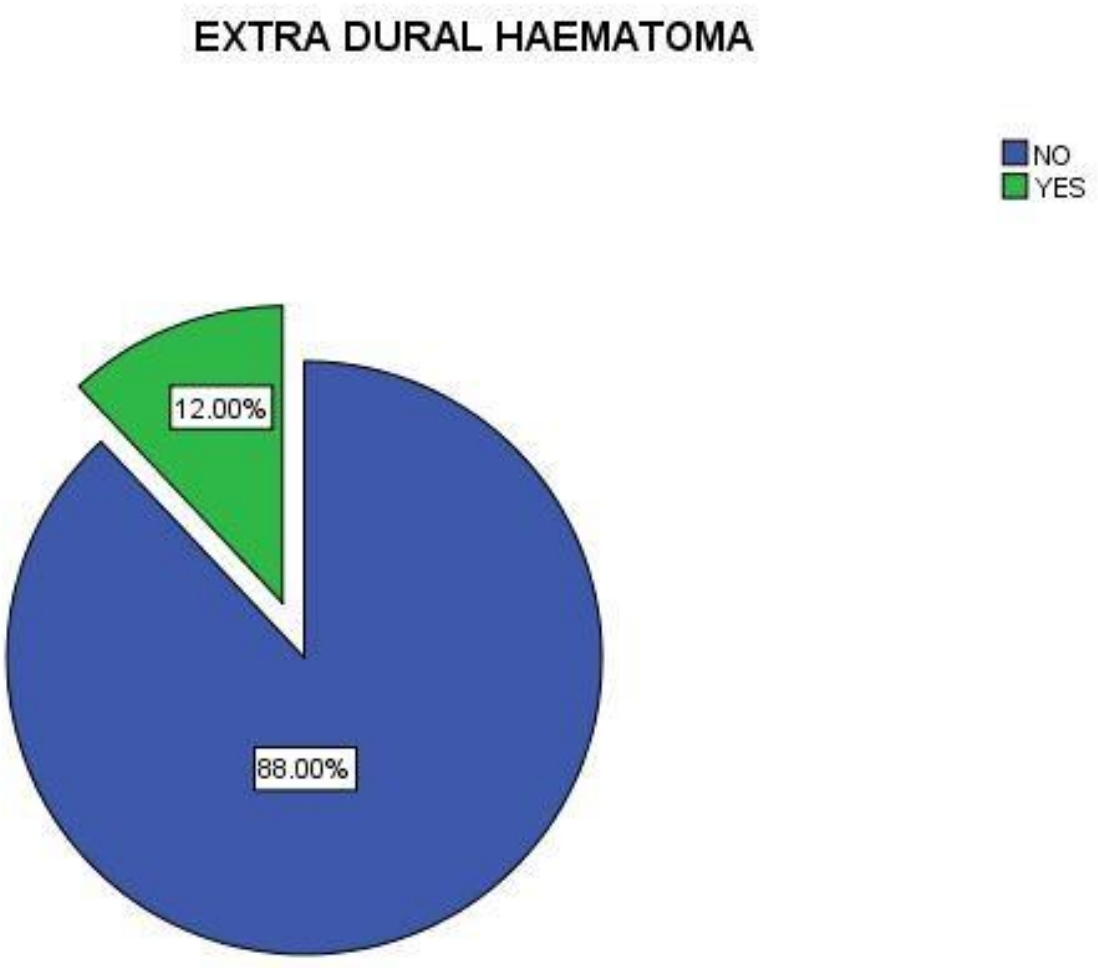
RISK ESTIMATE OF SAH – TABLE - 8

		95% Confidence Interval	
	Value	Lower	Upper
Odds Ratio for SUB ARACNOID HAEMORRHAGE (NO / YES)	1.414	.776	2.576
For cohort Coagulation status = Negative	1.182	.871	1.605
For cohort Coagulation status = Positive	.836	.622	1.124
N of Valid Cases	250		

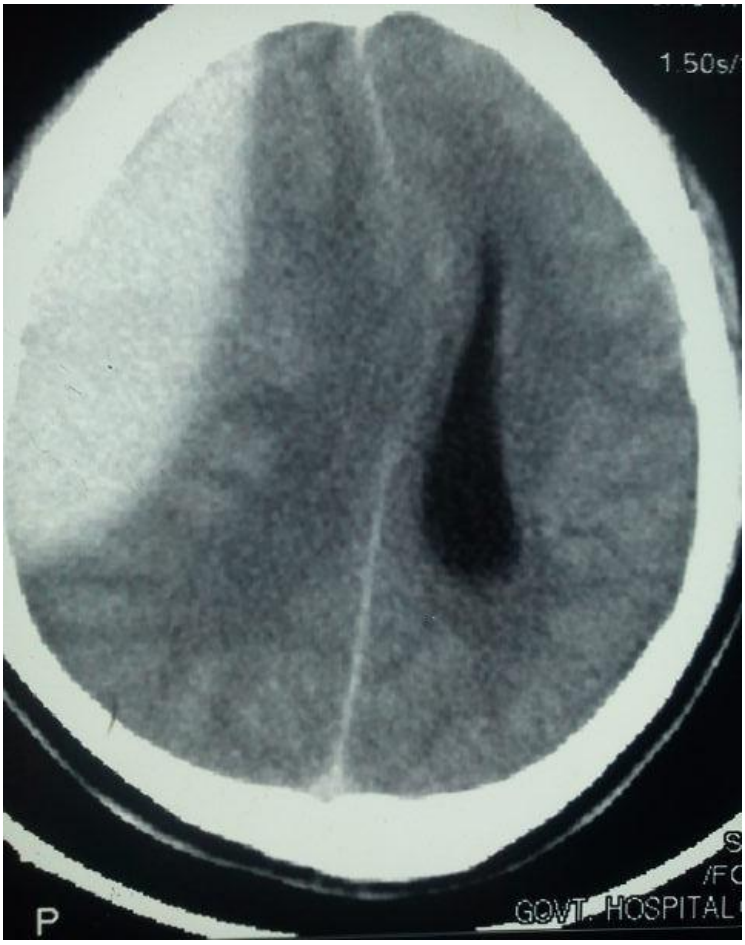
In patients with TBI having SAH, the Odds of developing coagulopathy is 1.414 and it is not statistically significant.

EXTRA DURAL HAEMATOMA– TABLE - 9

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	NO	220	88.0	88.0	88.0
	YES	30	12.0	12.0	100.0
	Total	250	100.0	100.0	



Frequency table and the Pie chart demonstrate that 12% of the studied patients had EDH.



Pic. 3. Right Fronto parietal EDH with midline shift.

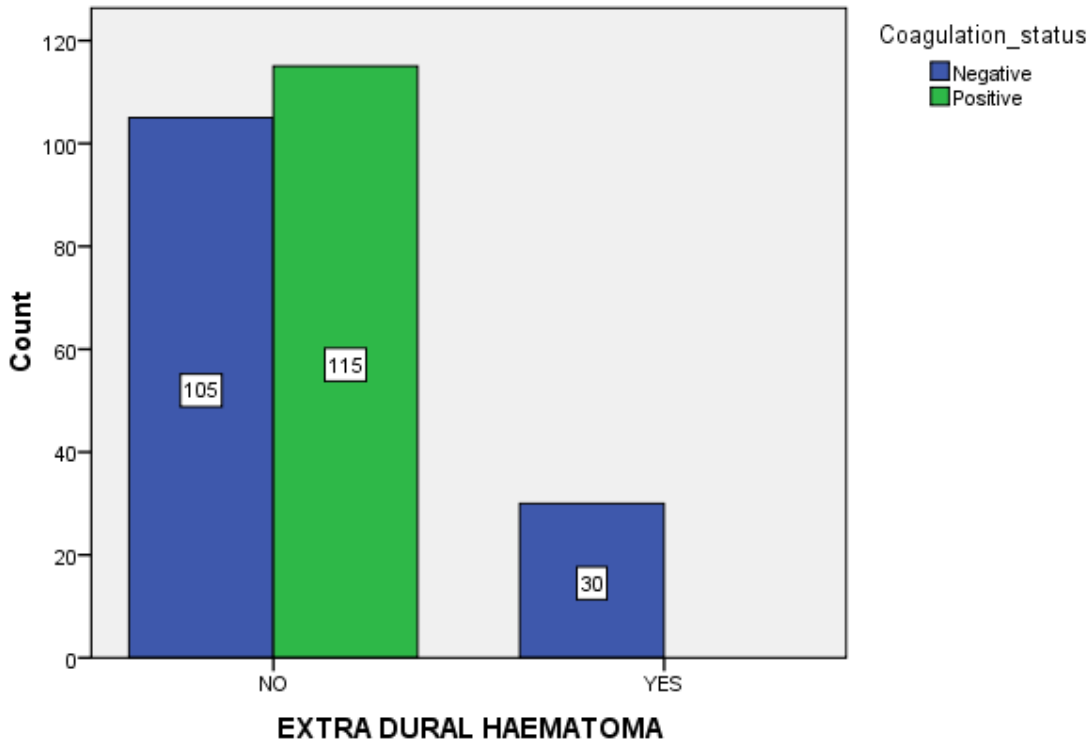
- The following tables analyze the relation of the Extra Dural Haematoma to the development of coagulation disturbance.

CROSSTABS - 10

EXTRA DURAL HAEMATOMA * COAGULATION STATUS CROSS TABULATION

			Coagulation status		
			Negative	Positive	Total
EXTRA DURAL HAEMATOMA	NO	Count	105	115	220
		% within EXTRA DURAL HAEMATOMA	47.7%	52.3%	100.0%
	YES	Count	30	0	30
		% within EXTRA DURAL HAEMATOMA	100.0%	.0%	100.0%
	Total	Count	135	115	250
		% within EXTRA DURAL HAEMATOMA	54.0%	46.0%	100.0%

The above table shows that no patients who had EDH developed coagulopathy.



The percentage of occurrence of coagulopathy in EDH is 0% shown in the above Bar chart.

CHI-SQUARE TESTS FOR EDH – TABLE -11

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	29.040[a]	1	.001		
Continuity Correction[b]	26.974	1	.001		
Likelihood Ratio	40.442	1	.001		
Fisher's Exact Test				.001	.001
N of Valid Cases	250				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.80.

b. Computed only for a 2x2 table

The Pearson Chi-Square and Fisher's Exact Test values show that the absence coagulation disturbance in extradural haematoma patients is significant.

RISK ESTIMATE OF EDH – TABLE - 12

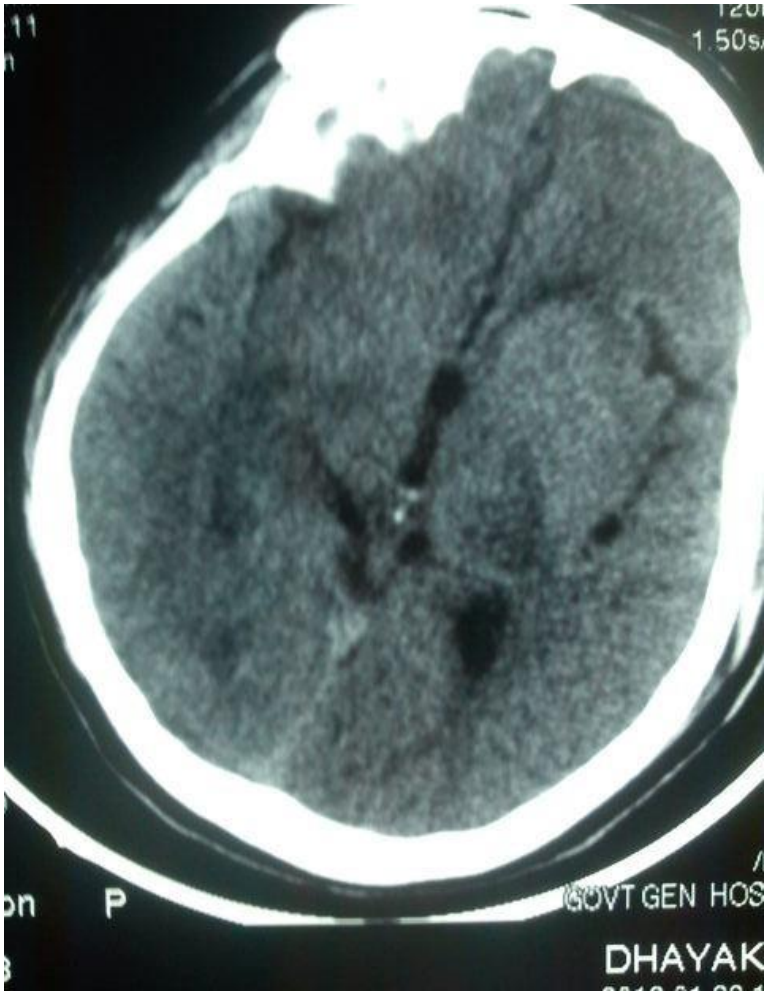
		95% Confidence Interval	
	Value	Lower	Upper
For cohort Coagulation status = Negative N of Valid Cases	.477 250	.416	.548

The risk estimate for the development of coagulopathy in patients with EDH in TBI is about 0.477 and is not statistically significant.

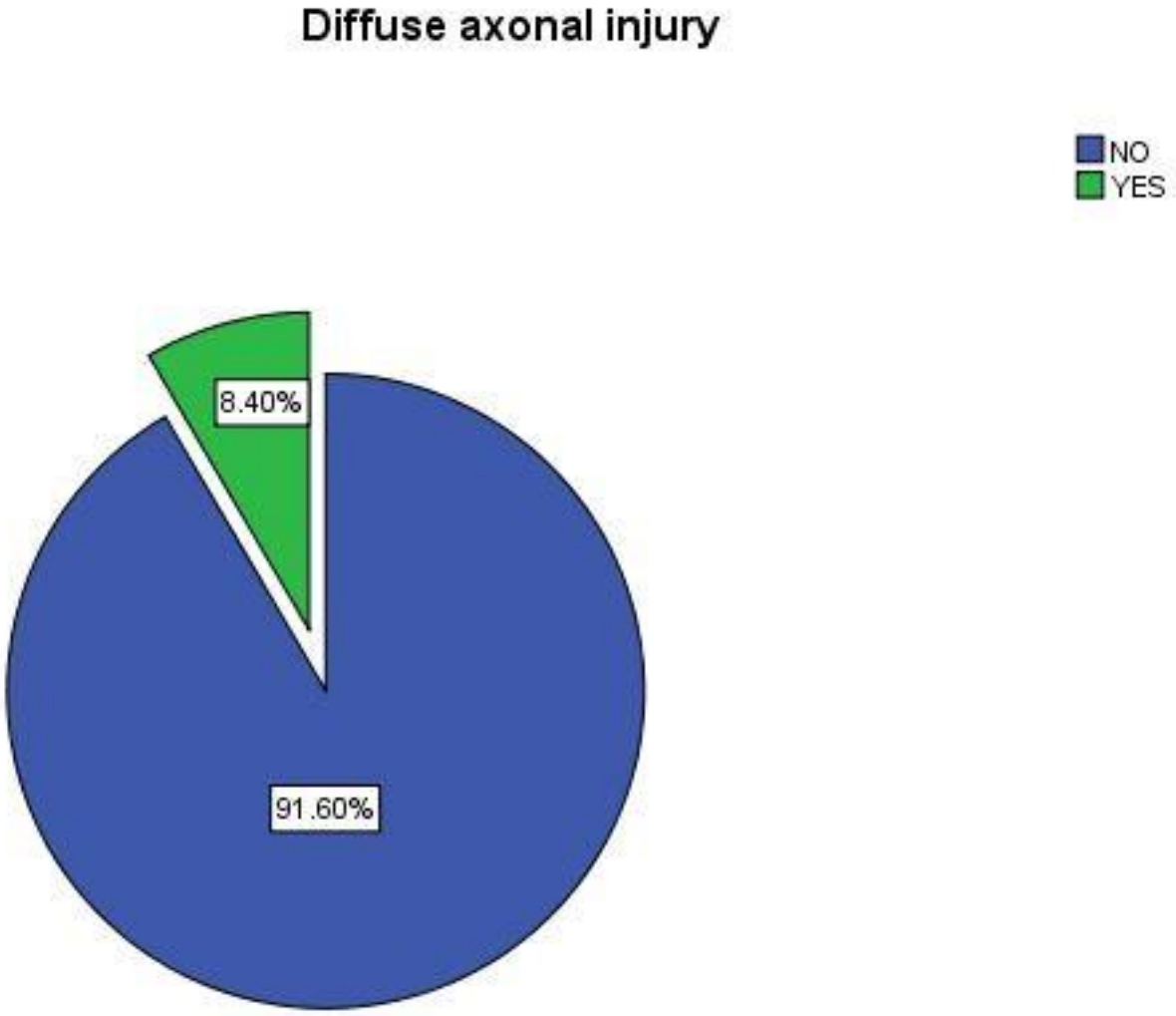
DIFFUSE AXONAL INJURY –TABLE - 13

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	NO	229	91.6	91.6	91.6
	YES	21	8.4	8.4	100.0
	Total	250	100.0	100.0	

- The valid percent in Diffuse Axonal Injury cases is about 8.4% as noted above in the frequency table



Pic. 4. CT Brain appears normal

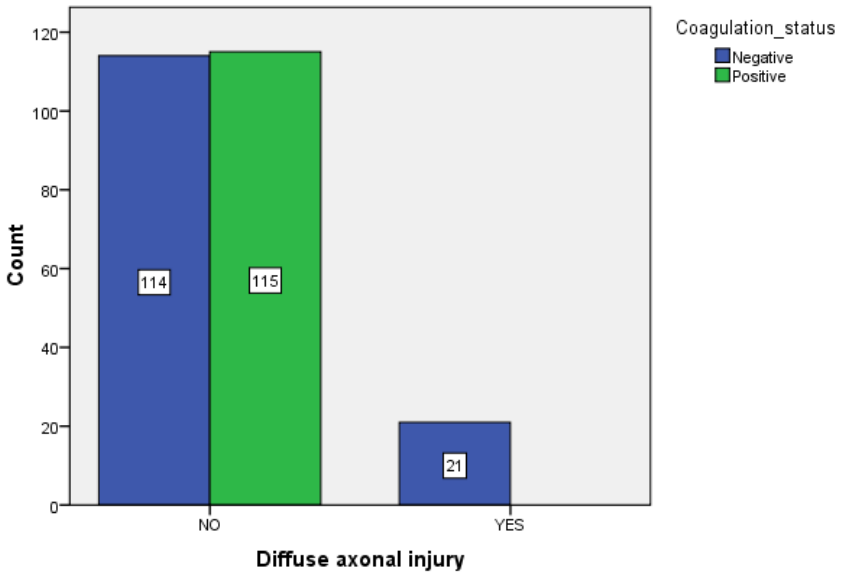


8.4 % OF PATIENTS CT BRAIN APPEARED AS NORMAL

CROSSTAB - 14

DIFFUSE AXONAL INJURY * COAGULATION STATUS CROSS TABULATION

			Coagulation status		
			Negative	Positive	Total
Diffuse axonal injury	NO	Count	114	115	229
		% within Diffuse axonal injury	49.8%	50.2%	100.0%
	YES	Count	21	0	21
		% within Diffuse axonal injury	100.0%	.0%	100.0%
	Total	Count	135	115	250
		% within Diffuse axonal injury	54.0%	46.0%	100.0%



None of the DAI patients developed coagulopathy.

CHI-SQUARE TESTS FOR DAI – TABLE -15

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.529[a]	1	.001		
Continuity Correction[b]	17.560	1	.001		
Likelihood Ratio	27.515	1	.001		
Fisher's Exact Test				.001	.001
N of Valid Cases	250				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.66.

b. Computed only for a 2x2 table

In cases of DAI in patients with TBI,Pearson Chi-Square test and Fisher's Exact Test show that the absence of the coagulopathy is significant.

RISK ESTIMATE OF DAI – TABLE - 16

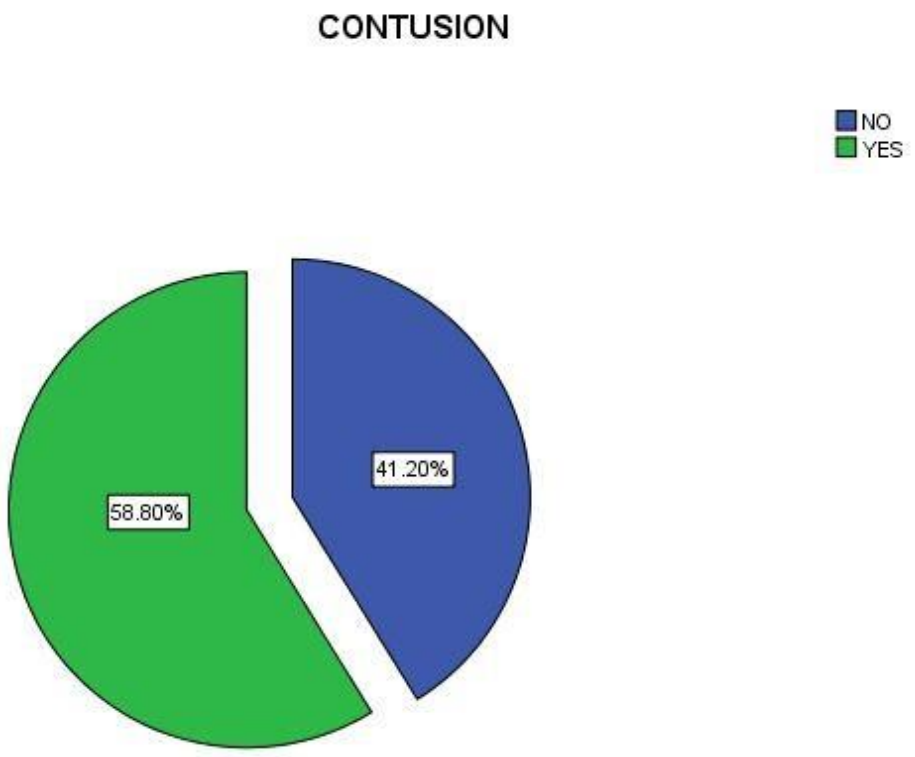
		95% Confidence Interval	
	Value	Lower	Upper
For cohort Coagulation status = Negative	.498	.437	.567
N of Valid Cases	250		

The estimated risk of developing coagulopathy in patients having DAI is about 0.498 which is statistically not significant.

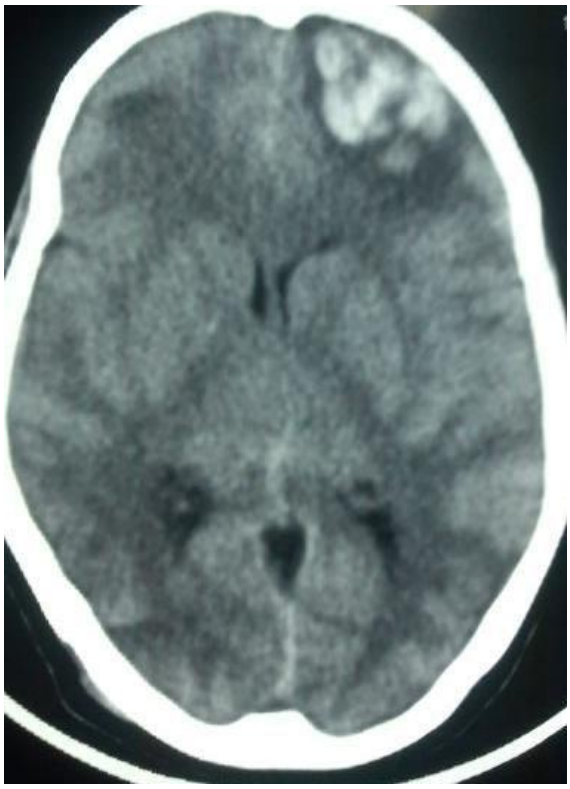
CONTUSION – TABLE - 17

		Frequency	***Percent***	***Valid Percent***	***Cumulative Percent***
Valid	NO	103	41.2	41.2	41.2
	YES	147	58.8	58.8	100.0
	Total	250	100.0	100.0	

Valid percent of 58.8% was noted in the frequency tabulation for the analysis of contusion patients.



Pie chart depicts of the 250 patients who had undergone evaluation 58.8% patients had brain parenchymal contusion.



Pic. 5. Left Frontal Contusion with edema.

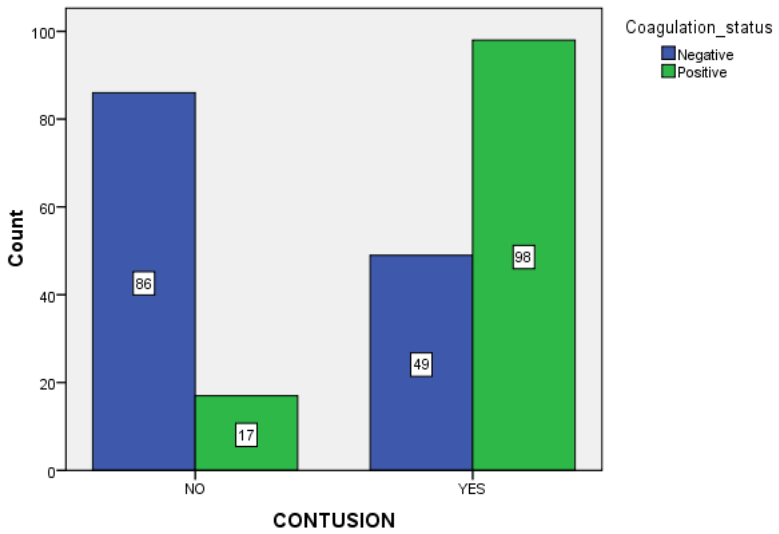
Pic. 6. Bilateral Frontal Contusion. R > Lt

CROSSTABS - 18

CONTUSION * COAGULATION STATUS CROSS TABULATION

			Coagulation status		
			Negative	Positive	Total
CONTUSION	NO	Count	86	17	103
		% within CONTUSION	83.5%	16.5%	100.0%
	YES	Count	49	98	147
		% within CONTUSION	33.3%	66.7%	100.0%
	Total	Count	135	115	250
		% within CONTUSION	54.0%	46.0%	100.0%

Cross tabulation and Bar chart show that 66.7% of acute severe head injury patients with contusion in the brain had coagulopathy.



CHI-SQUARE TESTS FOR CONTUSION – TABLE - 19

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	61.349[a]	1	.001		
Continuity Correction[b]	59.346	1	.001		
Likelihood Ratio	65.560	1	.001		
Fisher's Exact Test				.001	.001
N of Valid Cases	250				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 47.38.

b. Computed only for a 2x2 table

- Applying the Pearson Chi-Square and Fisher's Exact Test, observed value of less than .005 shows that the presence of coagulation disturbance in contusion patients is statistically significant.

- This reflects the importance of assessing coagulation factors in acute severe head injury patients.

Risk Estimate for CONTUSION – Table - 20

		95% Confidence Interval	
	Value	Lower	Upper
Odds Ratio for CONTUSION (NO / YES)	10.118	5.426	18.866
For cohort Coagulation status = Negative	2.505	1.962	3.198
For cohort Coagulation status = Positive	.248	.158	.388
N of Valid Cases	250		

The risk estimate for CONTUSION table shows that the contusion patients are prone to develop coagulation disturbance 10.118 odds chance. This is statistically very much significant.

SDH with CONTUSION * Coagulation status Cross tabulation - 21

			Coagulation status		
			2	1	Total
SDH AND CONTUSION	NO	Count	130	80	210
		% within SDH AND CONTUSION	61.9%	38.1%	100.0%
	YES	Count	5	35	40
		% within SDH AND CONTUSION	12.5%	87.5%	100.0%
	Total	Count	135	115	250
		% within SDH AND CONTUSION	54.0%	46.0%	100.0%

SDH with Contusion - Chi-Square Tests – Table - 22

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	33.016[a]	1	.001		
Continuity Correction[b]	31.057	1	.001		
Likelihood Ratio	35.728	1	.001		
Fisher's Exact Test				.001	.001
N of Valid Cases	250				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.40.

b. Computed only for a 2x2 table

The development coagulation in patient with acute SDH and Contusion is statistically significant as evidenced by the p value of < 0.005

SDH with Contusion - Risk Estimate – Table - 23

		95% Confidence Interval	
	Value	Lower	Upper
Odds Ratio for SDH AND CONTUSION (NO / YES)	11.375	4.280	30.234
For cohort Coagulation status = 2	4.952	2.167	11.321
For cohort Coagulation status = 1	.435	.353	.536
N of Valid Cases	250		

The Odds ratio for the patients who had acute SDH with Contusion is about 11.375.

SDH alone Risk Estimate – Table 24

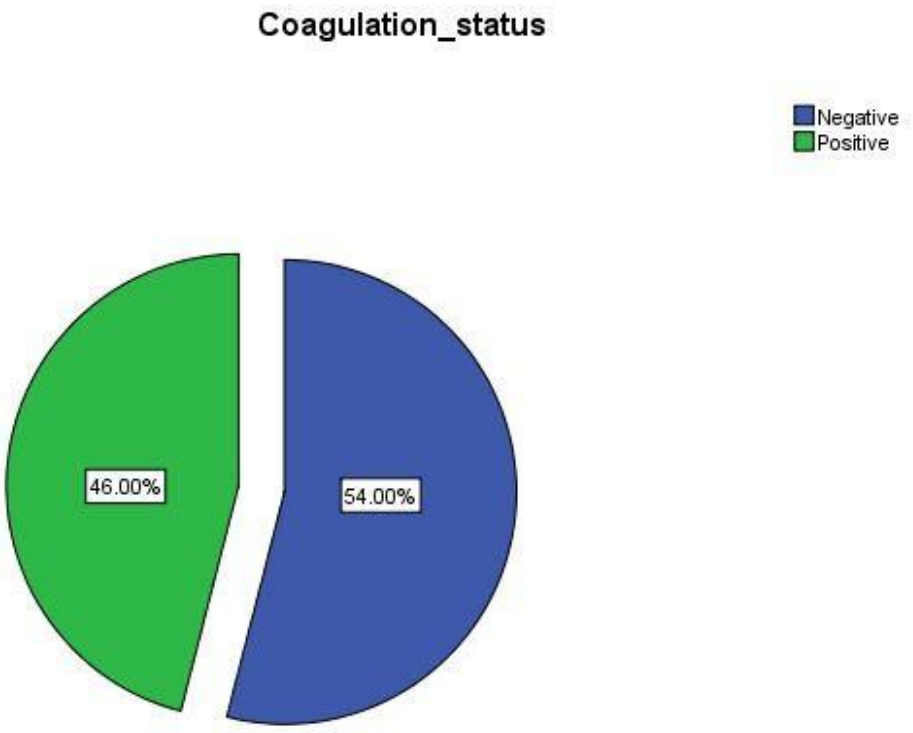
		95% Confidence Interval	
	Value	Lower	Upper
Odds Ratio for SUBDURAL HAEMATOMA (NO / YES)	3.434	1.931	6.106
For cohort Coagulation status = 2	1.907	1.348	2.698
For cohort Coagulation status = 1	.556	.433	.713
N of Valid Cases	250		

The tables 21 to 24 analyze the development coagulopathy in cases of SDH with Contusion and SDH alone in patients with TBI. They have shown that the Odds of developing coagulopathy in SDH with Contusion is about 11.375.In cases of SDH alone the Odds of developing coagulopathy is about 3.434. Hence this analysis shows that Contusion is the major factor determines the development of coagulopathy in patients with TBI.

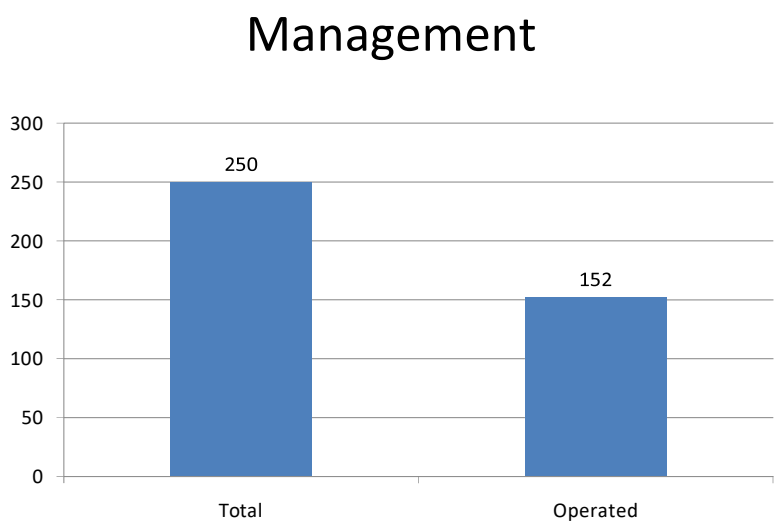
FREQUENCIES

Coagulation status – Table - 27

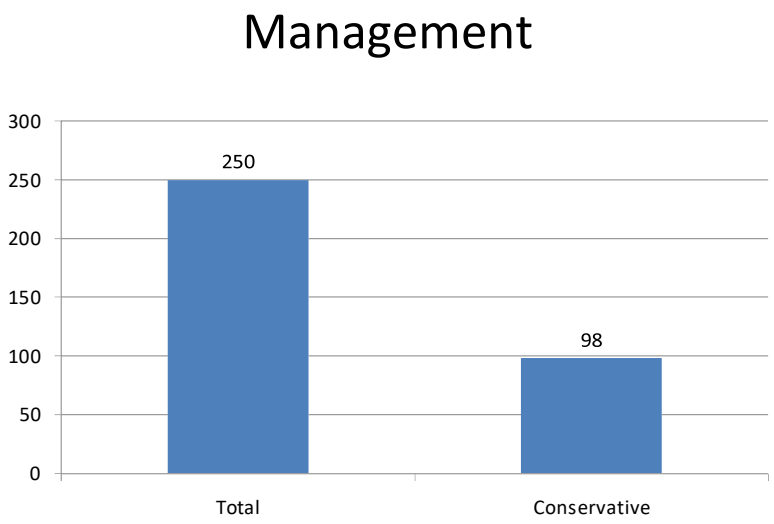
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	135	54.0	54.0	54.0
	Positive	115	46.0	46.0	100.0
	Total	250	100.0	100.0	



In total 250 patients 46% (115) of the patients developed coagulation disturbance.

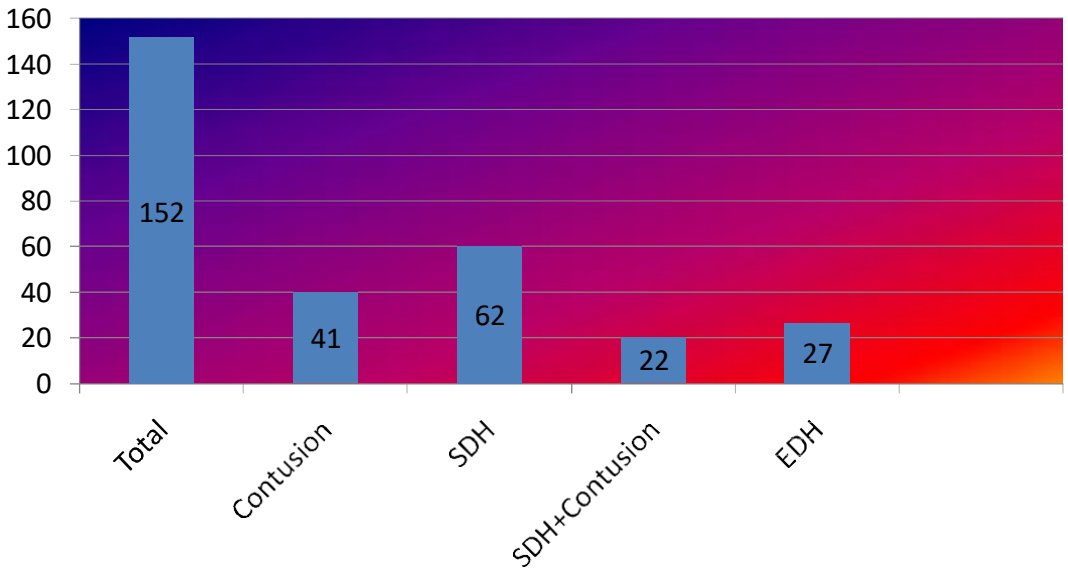


Of the 250 patients 152 patients had undergone surgery for various intracranial lesions.

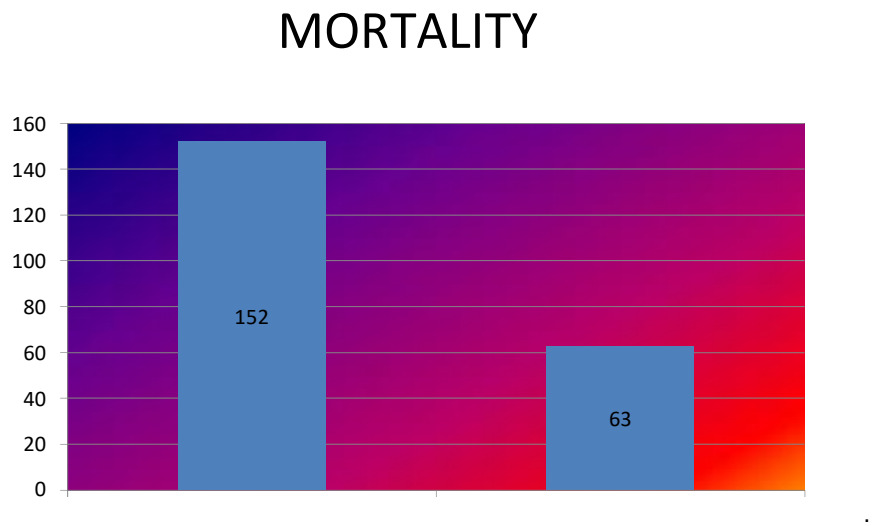


98 patients with traumatic brain injury were managed conservatively according to the lesion found in the CT Brain.

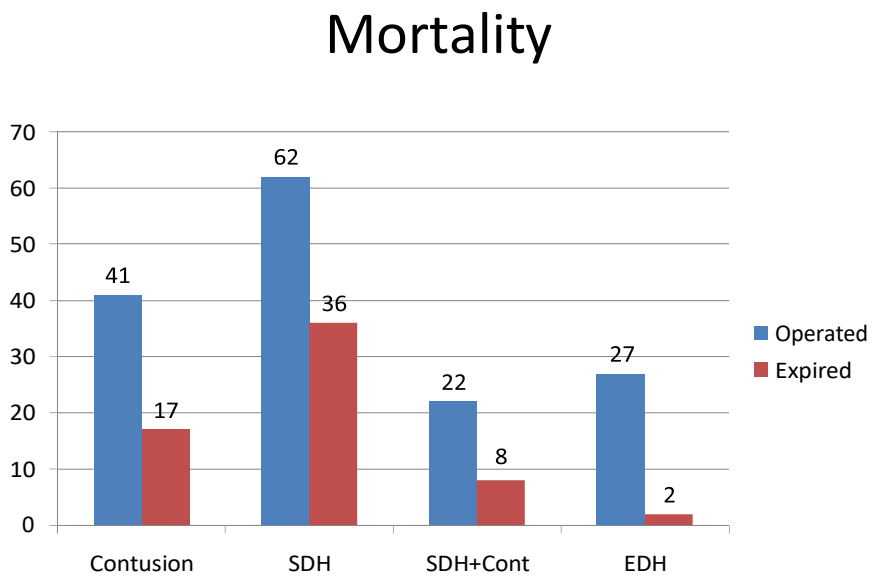
OPERATED



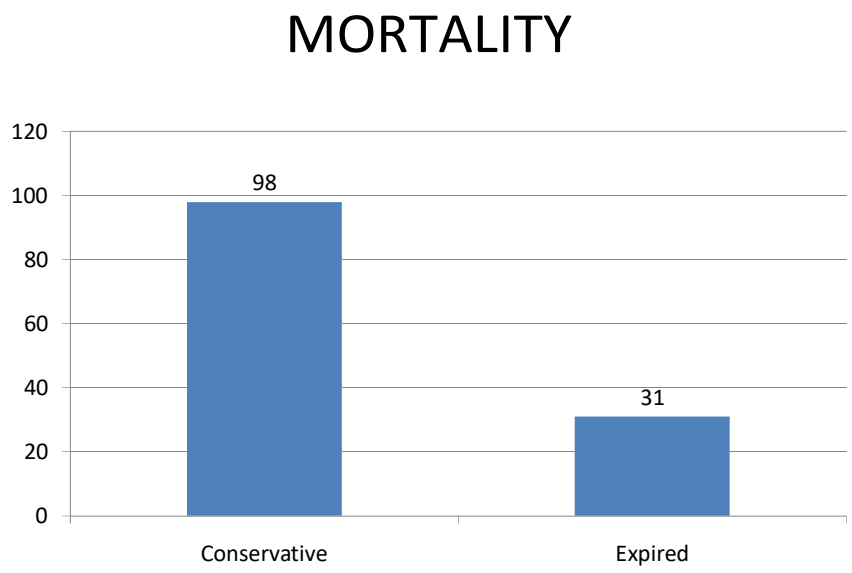
In the 250 study population 152 patients were operated. The above chart shows that maximum surgery done for acute SDH , next for Contusion .



In the operated 152 patients 89 patients were survived and 63 patients were expired with mortality percentage of 41.44.



Mortality is high in patients with Acute SDH about 58.06%. in Contusion it is about 41.46%. In acute SDH with Contusion mortality is about 36.36%.In EDH mortality is about 0.09%.



In 98 conservatively managed patients 31 patients were expired and the mortality percentage is about 31.63%.

DISCUSSION

DISCUSSION

In patients with Traumatic Brain Injury the occurrence of disturbance in the coagulation mechanism is very high. But various studies quote different values because different study uses different definitions for coagulopathy and their study design are varying between them hence the variation in the incidence of coagulopathy in the various studies is always possible.

According to the literature coagulopathy in severe TBI occurs in more than 60% of patients. Coagulopathy in mild traumatic brain injury is less than 1% only. Kuo and co-workers[19] demonstrated that patients dying from head injury have 100% incidence coagulopathy. But Chiaretti and co- workers[7] given a value of 10% chance of developing coagulopathy in traumatic brain injury patients. In Stein and co-workers data[31], 55% of patients with TBI had abnormalities in the PT, activated PTT or platelet count with evidence of delayed injury. They also found that PT and activated PTT derangement are higher in patients with delayed injury.

In our study we have analyzed coagulation profile in 250 severe traumatic brain injury patients. Of the 250 patients 178 were males and 78 were females. Patients in the age group of 21 to 50 constitute major part of the study population.

All patients with GCS 8 or less than 8 were treated in neuro intensive care unit. Following factors Prothrombin time, activated Partial Thromboplastin Time, International Normalised Ratio, Bleeding Time, Clotting Time, and Platelet Count are measured. Above mentioned factors were analyzed in Day 1, 3, 5, 7 and Day 9 (if needed).

In our study the incidence of coagulopathy comes around 46%. Out of 250 study patients 115 patients developed coagulopathy.

In patients with Traumatic Brain Injury patients who are having acute Subdural Haematoma and Brain Parenchymal Contusion are prone to develop coagulation disturbance.[19]

ACUTE SDH AND COAGULOPATHY

1. Of the 250 patients admitted, 73 patients had Acute SDH with a valid percent of 29.2%.

2. In those 73 patients 46 had coagulopathy and this constitutes 67.1% with estimated odds ratio of 3.434.

CONTUSION AND COAGULOPATHY

1. 147 patients had Contusions and this constitutes 58.8%

2. In the 147 patients who had contusion, about 98 patients developed coagulopathy – 66.7%.

3. In patients with contusion, odds of developing coagulopathy are about 10.118. This is 7 times higher than for Acute SDH which is statistically very significant.

SUBARACHNOID HAEMORRHAGE AND COAGULOPATHY

1. 55 patients had SAH – 22%

2. 29 patients had coagulopathy – 52.7%

3. Odds ratio for SAH is about 1.414 and in the statistical analysis the p value is about 0.257 and is not significant.

DIFFUSE AXONAL INJURY AND COAGULOPATHY

1. 21 patients had DAI – 8.4%.

2. No patients developed coagulopathy and odds ratio is 0.498.

EDH AND COAGULOPATHY

1. 30 patients had EDH – 12%.

2. No patients developed coagulopathy and odds ratio is 0.477.

SDH with Contusion and SDH alone having Coagulopathy

When comparing and analyzing the occurrence of coagulopathy in SDH with Contusion cases and SDH alone cases, it is evident that Contusion is the major factor that determines the occurrence of coagulopathy in SDH with Contusion cases.

From the above discussion and analysis it is evident that patients with severe TBI who are having Contusion and Acute SDH more prone to develop coagulation disturbance. In SDH with Contusion cases Contusion is the major factor that determines the occurrence of coagulopathy.

Those patients who had coagulopathy may manifest either in the form of developing new lesions or enlargement of the previous lesion detected in the CT Brain.

Recently, Yokota and co-workers [35], stated that Von Willebrand factor (vWF) level and thrombomodulin (TM) level are elevated in traumatic brain injury and useful as potential predictor of delayed brain injury. These factors are cerebral endothelial injury markers.

With regard to the treatment there are no definite guidelines exist in the literature. Various options are available such as FFP (Fresh Frozen Plasma) infusion, Antithrombotic drugs or Antithrombin III infusion. But no RCT trials to support class1 evidence for usage above drugs. Treating the primary cause should be the first target. Stein and colleagues stated [31] that for patients with coagulopathy FFP and platelet concentrates are recommended. May and colleagues [23] also found that use of FFP in patients with GCS 7 and less than 7 is useful. Keller and coworkers revealed that administration of

FFP in pediatric head injury patients with GCS less than 8 helps to prevent coagulation disturbance.

Grenander and colleagues[13] described Antithrombin III administration marginally reduced the hypercoagulation parameters.The CRASH-2 (Clinical Randomisation of Antifibrinolytic in Significant Haemorrhage) trial is a large international multi-centre randomized World Health Organization (WHO) supported placebo controlled trial. This trial studies the use of the antifibrinolytic agent tranexamic acid in adult trauma patients with significant haemorrhage. This large study will report it results in near future and that will provide more insight whether the antifibrinolytic agents useful in trauma patients or not. Use of recombinant factor VIIa (rFVIIa) in the TBI patients provides better out come and successful correction of coagulopathy. But recombinant factor VIIa is associated with the risk of developing theomboembolic complications. In spite of that, its effect on resolution of contusion in TBI patients and limiting the growth of the haematoma improves the functional outcome and reduces the mortality when used within 4 hours of injury.

In our study we have used FFP and Platelet concentrate in patients who developed coagulopathy as per the need of the patient's condition and during the surgery if needed. 115patients who developed coagulopathy were treated with FFP. 4 units per day along with monitoring the PT, activated PTT, INR, BT, CT and transfusion of platelet concentrate if platelet count value shows significant drop from the initial measured value or below 1 lakh .

CONCLUSION

CONCLUSION

1. In patients with severe Traumatic Brain Injury, coagulation disturbance occurs more commonly and should be monitored vigilantly when the patient is having brain parenchymal haematoma or acute subdural haematoma.

2. Patients with TBI having extradural haematoma, subarachnoid haemorrhage or diffuse axonal injury are less likely to develop coagulation disturbance.

3. Monitoring the coagulation profile should be mandatory for all severe traumatic brain injury patients.

4. Patients who developed coagulopathy have high chance of developing new lesions or enlargement of the initial lesion detected in the CT Brain.

5. Even though there are no standard guidelines to treat coagulopathy in TBI patients, it is safer to use FFP if the patient develops coagulopathy.

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PROFORMA

PROFORMA

COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY

NAME: AGE/SEX : IP No:

MIN :

DOA :

Mode of Injury :

Time of Injury :

Time of Surgery : GCS :

Initial CT Brain :

INTERVENTION :

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
GCS									
BT / CT									
INR									
PT / APTT									
Platelets									
Peripheral smear									
CT Brain									
Procedure									
Others									

Follow up :

Outcome :

MASTER CHART

1	Chengaiyan	45/M	14-5-11	9161	E2V1M5	Rt. FTP Acute SDH,Rt.FP SAH	Conservative	Negative	E3V3M5 on D14
2	Elumalai	52/M	14-5-11	9167	E2V1M4	Rt.F & T Contusion, Rt. FP SAH, Shift	Rt.FTPDC&Evacuationofcont	Positive	E3VtM5onD20
3	Rajan	44/M	16-5-11	9212	E1V1M5	Rt. F&T,Lt. T&P Contusion, #Rt.T&P	Conservative	Positive	Expired on D4
4	Murugan	67/M	16-5-11	9217	E2V1M4	Lt.FTP Acute SDH with Shift	Lt.FTPDC&EvacuationofSDH	Negative	E3V3M5 on D17
5	Annammal.	23/F	16-5-11	9231	E1V1M5	Lt.FTP Acute SDH Lt.FP SAH & Shift	Lt.FTPDC&EvacuationofSDH	Positive	E3V3M5 on D26
6	Suresh	31/M	17-5-11	9264	E2V1M5	DAI	Conservative	Negative	E3V4M6OnD13
7	Mannangatti	27/M	17-5-11	9271	E1V1M5	Rt. FP EDH & # Rt. Frontal	Rt.FP Craniotomy & evacuation	Negative	E4V5M6 on D12
8	Charles	54/M	20-5-11	9397	E2V1M5	Rt.F & P Contusion,DCE,#Lt.Occipital	Conservative	Positive	E2VtM5onD23
9	Moorthy	58/M	21-5-11	9427	E1V1M2	Lt.FTP Acute SDH, Lt.F&P Contusion	Lt.FTPDC&EvacuationofSDH	Positive	Expired on D2
10	Ponnathal.	37/F	22-5-11	9441	E1V1M5	Tentorial bleed,# Occipital	Conservative	Negative	E4V4M6 on D15
11	Sivaraj	14/M	22-5-11	9447	E2V1M5	Lt.Temp contusion,Lt.FT SAH	Conservative	Negative	E3VEM5 on D12
12	Kalaiyan	38/M	22-5-11	9462	E1V1M5	DAI	Conservative	Negative	E4V4M5onD9
13	Guru	47/M	24-5-11	9586	E2V1M4	Lt.Frontal contusion,Lt.FP SAH	Conservative	Positive	E3V3M5 on D17
14	Punniakodi	53/M	24-5-11	9591	E1V1M2	Lt.FTP SAH,Brain stem cont,Tent ble	Conservative	Positive	Expired on D1
15	Murugesan	37/M	25-5-11	9614	E1V1M2	Lt.FTP Acute SDH,#RT.Occipital	Lt.FTPDC&EvacuationofSDH	Positive	Expired on D2
16	Muthu	28/M	25-5-11	9618	E1V2M5	Lt.FTP Acute EDH,# Lt. F&P	Lt.FTP Craniotomy & evacuation	Negative	E4V4M6 on D9
17	Chandran	16/M	25-5-11	9628	E2V1M5	DAI	Conservative	Negative	E4V3M5 on D9
18	Kalaiselvi.	32/F	28-5-11	9814	E1V1M4	Lt.Temp contusion,Lt.FT Ac SDH,shift	Lt.FTP DC&Evacuation Cont,SDH	Positive	Expired on D2
19	Santhosam	42/M	28-5-11	9819	E1V1M1	Br.Stem.Cont, DCE	Conservative	Negative	Expired on D1
20	Rajkumar	64/M	28-511	9839	E1V2M5	B/L Frontal Contusion, mass effect+	Bifrontal DC	Positive	Expired on D5
21	Geetha.	31/F	29-5-11	9894	E1V2M5	Rt. Temp EDH,# Rt .Temp	Rt.Temporal cranio&evacuation	Negative	E4V4M6 on D10
22	Barathan	27/M	29-5-11	9897	E1V2M5	Rt.FTP Ac.SDH,#Lt.Temp, shift	Rt. FTP DC & Evacuation of SDH	Positive	E3V4M6 on D15
23	Konthandanayag	47/F	29-5-11	9914	E1V1M3	Occipital horn IVH, DAI	Conservative	Negative	Expired on D6
24	Munusamy	61/M	31-5-11	10161	E1V2M5	B/L Frontal Contusion,Lt.Temp SAH	Conservative	Positive	E3V4M6 on D22
25	Manigandan	35/M	31-5-11	10166	E2V1M4	Rt,Frontal cont with mass effect +	Rt Frontal DC & Evacuation	Positive	E4V4M6 on D14
26	Sathyanarayan	23/M	31-5-11	10167	E1V2M5	Rt.FTP Ac.EDH,#Rt.R&T, shift +	Rt. FTP Craniotomy&evacuation	Negative	E4V4M6 on D12
27	Prakash	36/M	31-5-11	10177	E1V2M5	Lt.Temp Contusion	Conservative	Negative	E3V4M6 on D5
28	Vijaya.	25/F	01-0611	10265	E1V1M5	Lt Frontal EDH,#Lt.Frontal	Lt.Frontal Craniotomy&evac	Negative	E4V5M6 on D12
29	Rathinavel	47/M	02-0611	10283	E1V1M3	B.Stem,Lt.Fr.Cont,Rt.FDP SDH,#Lt.Te	Conservative	Positive	Expired on D 1
30	Kesavan	55/M	02-0611	10289	E1V2M5	Lt.FTP Acute SDH, Lt.Temp Contusion	Lt.FTP DC&Evacuation Cont,SDH	Positive	E3V3M5 on D17
31	Gangalaxmi.	41/F	02-0611	10291	E1V1M5	DAI	Conservative	Negative	E2VtM5onD16
32	Barathi.	36/F	04-0611	10456	E1V1M4	Rt.Frontal,Lt.Parietal,Br.Stem Cont	Conservative	Negative	E4VtM5onD19
33	Mohammed bas	23/M	04-0611	10462	E2V1M5	Lt.FP EDH,#Lt.Parietal	Lt.FP craniotomy&evacuation	Negative	E4V4M6 on D12
34	Rajendran	50/M	05-0611	10492	E1V1M2	Rt.FTP SAH,B.Stem cont,DCE	Conservative	Negative	Expired on D5
35	Anbarasu	68/M	05-0611	10516	E1V1M5	Lt.FTP Acute SDH,Rt.FP SAH, shift +	Lt.FTP DC&Evacuation of SDH	Negative	E3VtM5onD15
36	Chinnaponnu.	52/F	07-0611	10617	E1V1M5	Lt.Temp cont	Conservative	Positive	E2VtM5onD16
37	Xavier	60/M	08-0611	10689	E1V1M3	BiFrontal cont,Rt.Frontal SDH,#Occi	B/L Frontal DC Evac of SDH,Cont	Positive	Expired on D4
38	Miruthula.	47/F	08-0611	10722	E1V1M3	Rt.F,P cont, CCD # Rt. Frontal	WD,#segment excision	Negative	Expired on D2

39	Dhanasekar	19/M	08-0611	10737	E2V1M5	B.Stem cont,#Rt. Frontal	Conservative	Negative	E3V4M6 on D14
40	Baranikumar	42/M	10-0611	10841	E1V2M5	Lt.FTP Ac SDH,Lt.Fr.Cont,#Rt.F&P	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
41	Elangovan	55/M	10-0611	10862	E2V1M5	Lt Frontal contusion	Conservative	Negative	E4V4M6 on D9
42	Santhanam*	37/M	10-0611	10868	E1V1M5	Tent,Basal cistern bleed,Rt.Parie.Cont	Conservative	Positive	E3VtM5 on D20
43	Periakaruppan	47/M	14-0611	11035	E2V1M5	Rt.Fr.Cont,Rt.FP SAH,#Lt.Occipital	Rt.Frontal Craniotomy & evac	Positive	E3V3M5 on D12
44	Kuppan	32/M	14-0611	11047	E1V1M1	Lt. FTP Ac.SDH,Lt.FTP SAH,#Rt.Parie	Conservative	Negative	Expired on D1
45	Punniakodi	49/M	14-0611	11065	E1V1M3	Lt.FT Ac SDH,Lt.Temp.Cont,#Lt.F&T	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
46	Fathima beevi.	26/F	18-0611	11266	E1V2M5	Rt.F&P Cont, DCE	Conservative	Positive	E3V3M5 on D19
47	Varalaxmi.	34/F	18-0611	11275	E1V2M5	B/L Occipital Horn IVH	Conservative	Negative	E3V4M5 on D13
48	Murali	78/M	21-0611	11423	E1V1M2	B/L Frontal,Lt.Temp cont,#Occipital	Conservative	Positive	Expired on D4
49	Sigappi.	49/F	21-0611	11447	E1V2M5	Rt.Frontal EDH,#Rt.Frontal	Rt.Frontal Craniotomy & evac	Negative	E4V5M6 on D12
50	Mariammal.	22/F	21-0611	11461	E2V1M5	Rt.FTP thin SDH,Rt.Temp cont,#L.T&P	Conservative	Negative	E3V4M6 on D16
51	Elumalai	45/M	22-06-11	11482	E2V1M5	Rt. FTP Acute SDH,Rt.FP SAH	Conservative	Negative	E3V3M5 on D14
52	Kumar	52/M	22-06-11	11491	E2V1M4	Rt.F& T Contusion, Rt. FP SAH, Shift	Rt. FTP DC & Evacuation of cont	Positive	E3VtM5 on D20
53	Palani	44/M	24-6-11	11567	E1V1M5	Rt. F&T,Lt. T&P Contusion, #Rt.T&P	Conservative	Positive	Expired on D4
54	Mannadi	67/M	24-6-11	11575	E2V1M4	Lt.FTP Acute SDH with Shift	Lt. FTP DC & Evacuation of SDH	Negative	E3V3M5 on D17
55	Suba.	23/F	24-6-11	11589	E1V1M5	Lt.FTP Acute SDH Lt.FP SAH & Shift	Lt. FTP DC & Evacuation of SDH	Positive	E3V3M5 on D26
56	Muthu	31/M	25-6-11	11623	E2V1M5	DAI	Conservative	Negative	E3V4M6 On D 13
57	Chandran	27/M	25-6-11	11665	E1V1M5	Rt. FP EDH & # Rt. Frontal	Rt.FP Craniotomy & evacuation	Negative	E4V5M6 on D12
58	Chinnathampi	54/M	27-6-11	11718	E2V1M5	Rt.F& P Contusion,DCE,#Lt.Occipital	Conservative	Positive	E2VtM5 on D23
59	Moses	58/M	27-6-11	11724	E1V1M2	Lt.FTP Acute SDH, Lt.F&P Contusion	Lt. FTP DC & Evacuation of SDH	Positive	Expired on D2
60	Priya.	37/F	29-6-11	11816	E1V1M5	Tentorial bleed,# Occipital	Conservative	Negative	E4V4M6 on D15
61	Raja	14/M	29-6-11	11823	E2V1M5	Lt.Temp contusion,Lt.FT SAH	Conservative	Negative	E3VEM5 on D12
62	Murugan	38/M	30-6-11	11851	E1V1M5	DAI	Conservative	Negative	E4V4M5 on D 9
63	Ponmuthu	47/M	30-6-11	11865	E2V1M4	Lt.Frontal contusion,Lt.FP SAH	Conservative	Positive	E3V3M5 on D17
64	Thangaian	53/M	01-0711	11902	E1V1M2	Lt.FTP SAH,Brain stem cont,Tent ble	Conservative	Positive	Expired on D1
65	Sundaramoorthy	37/M	01-0711	11911	E1V1M2	Lt.FTP Acute SDH,#RT.Occipital	Lt. FTP DC & Evacuation of SDH	Positive	Expired on D2
66	Kannan	28/M	02-0711	11965	E1V2M5	Lt.FTP Acute EDH,# Lt. F&P	Lt.FTP Craniotomy& evacuation	Negative	E4V4M6 on D9
67	Dhanasekar	16/M	02-0711	11977	E2V1M5	DAI	Conservative	Negative	E4V3M5 on D9
68	Kanchana.	32/F	03-0711	12004	E1V1M4	Lt.Temp contusion,Lt.FT Ac SDH,shift	Lt.FTP DC&Evacuation Cont,SDH	Positive	Expired on D2
69	Zohindersingh	42/M	03-0711	12013	E1V1M1	Br.Stem.Cont, DCE	Conservative	Negative	Expired on D1
70	Ragavan	64/M	04-0711	12067	E1V2M5	B/L Frontal Contusion, mass effect+	Bifrontal DC	Positive	Expired on D5
71	Pardesi.	31/F	04-0711	12075	E1V2M5	Rt. Temp EDH,# Rt .Temp	Rt.Temporal cranio&evacuation	Negative	E4V4M6 on D10
72	Kumarasamy	27/M	05-0711	12110	E1V2M5	Rt.FTP Ac.SDH,#Lt.Temp, shift	Rt. FTP DC & Evacuation of SDH	Positive	E3V4M6 on D15
73	Chandrakala.	47/F	05-0711	12119	E1V1M3	Occipital horn IVH, DAI	Conservative	Negative	Expired on D3
74	Santhanam	61/M	07-0711	12189	E1V2M5	B/L Frontal Contusion,Lt.Temp SAH	Conservative	Positive	E3V4M6 on D22
75	Shameelahamed	35/M	07-0711	12198	E2V1M4	Rt,Frontal cont with mass effect +	Rt Frontal DC & Evacuation	Positive	E4V4M6 on D14
76	Kandasamy	23/M	08-0711	12223	E1V2M5	Rt.FTP Ac.EDH,#Rt.R&T, shift +	Rt. FTP Craniotomy&evacuation	Negative	E4V4M6 on D12

77	Sekar	36/M	08-0711	12241	E1V2M5	Lt.Temp Contusion	Conservative	Negative	E3V4M6 on D5
78	Kavitha.	25/F	10-0711	12309	E1V1M5	Lt Frontal EDH,#Lt.Frontal	Lt.Frontal Craniotomy&evac	Negative	E4V5M6 on D12
79	Senthil	47/M	10-0711	12321	E1V1M3	B.Stem,Lt.Fr.Cont,Rt.FDP SDH,#Lt.Te	Conservative	Positive	Expired on D1
80	Munivel	55/M	11-0711	12378	E1V2M5	Lt.FTP Acute SDH, Lt.Temp Contusion	Lt.FTP DC&Evacuation Cont,SDH	Positive	E3V3M5 on D17
81	Punithamary.	41/F	11-0711	12393	E1V1M5	DAI	Conservative	Negative	E2VtM5 on D16
82	Balammal	36/F	12-0711	12423	E1V1M4	Rt.Frontal,Lt.Parietal,Br.Stem Cont	Conservative	Negative	E4VtM5 on D19
83	Mohan	23/M	12-0711	12441	E2V1M5	Lt.FP EDH,#Lt.Parietal	Lt.FP craniotomy&evacuation	Negative	E4V4M6 on D12
84	Veearaiyan	50/M	14-0711	12497	E1V1M2	Rt.FTP SAH,B.Stem cont,DCE	Conservative	Negative	Expired on D5
85	Gothandam	68/M	14-0711	12512	E1V1M5	Lt.FTP Acute SDH,Rt.FP SAH, shift +	Lt.FTP DC&Evacuation of SDH	Negative	E3VtM5 on D15
86	Annakili.	52/F	14-0711	12519	E1V1M5	Lt.Temp cont	Conservative	Positive	E2VtM5 on D16
87	Karupasamy	60/M	15-0711	12561	E1V1M3	BiFrontal cont,Rt.Frontal SDH,#Occi	B/L Frontal DC Evac of SDH,Cont	Positive	Expired on D4
88	Subathra	47/F	15-0711	12574	E1V1M3	Rt.F,P cont, CCD # Rt. Frontal	WD,#segment excision	Negative	Expired on D2
89	Karthick	19/M	17-0711	12601	E2V1M5	B.Stem cont,#Rt. Frontal	Conservative	Negative	E3V4M6 on D14
90	Syed	42/M	17-0711	12614	E1V2M5	Lt.FTP Ac SDH,Lt.Fr.Cont,#Rt.F&P	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
91	Kaverimanian	55/M	18-0711	12661	E2V1M5	Lt Frontal contusion	Conservative	Negative	E4V4M6 on D9
92	Venkateasn	37/M	18-0711	12677	E1V1M5	Tent,Basal cistern bleed,Rt.Parie.Cont	Conservative	Positive	E3VtM5 on D20
93	Vijayakumar	47/M	15-0711	12689	E2V1M5	Rt.Fr.Cont,Rt.FP SAH,#Lt.Occipital	Rt.Frontal Craniotomy & evac	Positive	E3V3M5 on D12
94	Sebastin	32/M	16-0711	12706	E1V1M1	Lt. FTP Ac.SDH,Lt.FTP SAH,#Rt.Parie	Conservative	Negative	Expired on D1
95	Devaraj	49/M	16-0711	12714	E1V1M3	Lt.FT Ac SDH,Lt.Temp.Cont,#Lt.F&T	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
96	Chinnathayi.	26/F	16-0711	12719	E1V2M5	Rt.F&P Cont, DCE	Conservative	Positive	E3V3M5 on D19
97	Murugamma	34/F	18-0711	12792	E1V2M5	Rt.Occipital Horn IVH	Conservative	Negative	E3V4M5 on D13
98	Rosaiah	78/M	19-0711	12807	E1V1M2	B/L Frontal,Rt.Temp cont,#Occipital	Conservative	Positive	Expired on D4
99	Thamaraiselvi.	49/F	20-0711	12845	E1V2M5	Lt.Frontal EDH,#Lt.Frontal	Lt.Frontal Craniotomy& evac	Negative	E4V5M6 on D12
100	Mary.	22/F	20-0711	12856	E2V1M5	Rt.FTP thin SDH,Rt.Temp cont,#L.T&P	Conservative	Negative	E3V4M6 on D16
101	Thennarasu	45/M	21-0711	12887	E2V1M5	Lt. FTP Acute SDH,Rt.FP SAH	Conservative	Negative	E3V3M5 on D14
102	Muthusamy	52/M	22-0711	12909	E2V1M4	Lt.F & T Contusion, Rt. FP SAH, Shift	Lt. FTP DC & Evacuation of cont	Positive	E3VtM5 on D20
103	Mangalram	44/M	22-0711	12949	E1V1M5	Rt. F&T,Lt. T&P Contusion, #Rt.T&P	Conservative	Positive	Expired on D4
104	Kuppanna	67/M	22-0711	12957	E2V1M4	Lt.FTP Acute SDH with Shift	Lt. FTP DC & Evacuation of SDH	Negative	E3V3M5 on D17
105	Tamilarasi.	23/F	24-0711	13008	E1V1M5	Lt.FTP Acute SDH Lt.FP SAH & Shift	Lt. FTP DC & Evacuation of SDH	Positive	E3V3M5 on D26
106	Maran	31/M	25-0711	12067	E2V1M5	DAI	Conservative	Negative	E3V4M6 On D 13
107	Mahalingam	27/M	25-0711	12076	E1V1M5	Rt. FP EDH & # Rt. Frontal	Rt.FP Craniotomy & evacuation	Negative	E4V5M6 on D12
108	Sundaram	54/M	26-0711	12134	E2V1M5	Rt.F& P Contusion,DCE,#Lt.Occipital	Conservative	Positive	E2VtM5 on D23
109	Divakar	58/M	26-0711	12146	E1V1M2	Lt.FTP Acute SDH, Lt.F&P Contusion	Lt. FTP DC & Evacuation of SDH	Positive	Expired on D2
110	Mutharasi.	37/F	28-0711	12197	E1V1M5	Tentorial bleed,# Occipital	Conservative	Negative	E4V4M6 on D15
111	Mani	14/M	29-0711	12229	E2V1M5	Lt.Temp contusion,Lt.FT SAH	Conservative	Negative	E3VEM5 on D12
112	Mathavan	38/M	30-0711	12267	E1V1M5	DAI	Conservative	Negative	E4V4M5 on D9
113	Sarath	47/M	31-0711	12295	E2V1M4	Lt.Frontal contusion,Lt.FP SAH	Conservative	Positive	E3V3M5 on D17
114	Srinivasan	53/M	31-0711	12307	E1V1M2	Lt.FTP SAH,Brain stem cont,Tent ble	Conservative	Positive	Expired on D1

115	Suryakumar	37/M	02-0811	12387	E1V1M2	Lt.FTP Acute SDH,#RT.Occipital	Lt. FTP DC & Evacuation of SDH	Positive	Expired on D2
116	Guru	28/M	02-0811	12391	E1V2M5	Lt.FTP Acute EDH,# Lt. F&P	Lt.FTP Craniotomy& evacuation	Negative	E4V4M6 on D9
117	Tamilselvan	16/M	03-0811	12445	E2V1M5	DAI	Conservative	Negative	E4V3M5 on D9
118	Noorjahan.	32/F	03-0811	12458	E1V1M4	Lt.Temp contusion,Lt.FTAc SDH,shift	Lt.FTP DC&Evacuation Cont,SDH	Positive	Expired on D2
119	Pitchaimuthu	42/M	04-0811	12511	E1V1M1	Br.Stem.Cont, DCE	Conservative	Negative	Expired on D1
120	Samuvel	64/M	05-0811	12543	E1V2M5	B/L Frontal Contusion, mass effect+	Bifrontal DC	Positive	Expired on D5
121	Piraiselvi.	31/F	07-0811	12609	E1V2M5	Rt. Temp EDH,# Rt. Temp	Rt.Temporal cranio&evacuation	Negative	E4V4M6 on D10
122	Somasundar	27/M	07-0811	12623	E1V2M5	Rt.FTP Ac.SDH,#Lt.Temp, shift	Rt. FTP DC & Evacuation of SDH	Positive	E3V4M6 on D15
123	Sevvathal.	47/F	07-0811	12629	E1V1M3	Occipital horn IVH, DAI	Conservative	Negative	Expired on D5
124	Muthalagan	61/M	09-0811	12695	E1V2M5	B/L Frontal Contusion,Lt.Temp SAH	Conservative	Positive	E3V4M6 on D22
125	Jeevankumar	35/M	10-0811	12756	E2V1M4	Rt,Frontal cont with mass effect +	Rt Frontal DC & Evacuation	Positive	E4V4M6 on D14
126	Subramani	23/M	10-0811	12765	E1V2M5	Rt.FTP Ac.EDH,#Rt.R&T, shift +	Rt. FTP Craniotomy&evacuation	Negative	E4V4M6 on D12
127	Senthilnathan	36/M	11-0811	12801	E1V2M5	Lt.Temp Contusion	Conservative	Negative	E3V4M6 on D5
128	Haseenabegam.	25/F	12-0811	12856	E1V1M5	Lt Frontal EDH,#Lt.Frontal	Lt.Frontal Craniotomy&evac	Negative	E4V5M6 on D12
129	Maraiyan	47/M	12-0811	12867	E1V1M3	B.Stem,Lt.Fr.Cont,Rt.FDP SDH,#Lt.Te	Conservative	Positive	Expired on D1
130	Jawahar	55/M	13-0811	12898	E1V2M5	Lt.FTP Acute SDH, Lt.Temp Contusion	Lt.FTP DC&Evacuation Cont,SDH	Positive	E3V3M5 on D17
131	Velayi.	41/F	15-0811	12978	E1V1M5	DAI	Conservative	Negative	E2VtM5 on D16
132	Puviarasi.	36/F	15-0811	12987	E1V1M4	Rt.Frontal,Lt.Parietal,Br.Stem Cont	Conservative	Negative	E4VtM5 on D19
133	Premkumar	23/M	15-0811	12996	E2V1M5	Lt.FP EDH,#Lt.Parietal	Lt.FP craniotomy&evacuation	Negative	E4V4M6 on D12
134	Nagamuthu	50/M	17-0811	13087	E1V1M2	Rt.FTP SAH,B.Stem cont,DCE	Conservative	Negative	Expired on D5
135	Kottaiyan	68/M	17-0811	13093	E1V1M5	Lt.FTP Acute SDH,Rt.FP SAH, shift +	Lt.FTP DC&Evacuation of SDH	Negative	E3VtM5 on D15
136	Kamatchi.	52/F	18-0811	13137	E1V1M5	Lt.Temp cont	Conservative	Positive	E2VtM5 on D16
137	Marappan	60/M	20-0811	13189	E1V1M3	BiFrontal cont,Rt.Frontal SDH,#Occi	B/L Frontal DC Evac of SDH,Cont	Positive	Expired on D4
138	Ponnalagi.	47/F	20-0811	13197	E1V1M3	Rt.F,P cont, CCD # Rt. Frontal	WD,#segment excision	Negative	Expired on D2
139	Anbarasan	19/M	21-0811	13218	E2V1M5	B.Stem cont,#Rt. Frontal	Conservative	Negative	E3V4M6 on D14
140	Charles	42/M	21-0811	13224	E1V2M5	Lt.FTP Ac SDH,Lt.Fr.Cont,#Rt.F&P	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
141	Suman	55/M	21-0811	13237	E2V1M5	Lt Frontal contusion	Conservative	Negative	E4V4M6 on D9
142	Karthick	37/M	22-0811	13258	E1V1M5	Tent,Basal cistern bleed,Rt.Parie.Cont	Conservative	Positive	E3VtM5 on D20
143	Mannavan	47/M	22-0811	13261	E2V1M5	Rt.Fr.Cont,Rt.FP SAH,# Lt.Occipital	Rt.Frontal Craniotomy & evac	Positive	E3V3M5 on D12
144	Kollappan	32/M	24-0811	13334	E1V1M1	Lt. FTP Ac.SDH,Lt.FTP SAH,#Rt.Parie	Conservative	Negative	Expired on D1
145	Senthamarai	49/M	24-0811	13341	E1V1M3	Lt.FT Ac SDH,Lt.Temp.Cont,#Lt.F&T	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
146	Mohanasundari.	26/F	25-0811	13367	E1V2M5	Rt.F&P Cont, DCE	Conservative	Positive	E3V3M5 on D19
147	Eswari.	34/F	26-0811	13395	E1V2M5	B/L Occipital Horn IVH	Conservative	Negative	E3V4M5 on D13
148	Gangadaran	78/M	26-0811	13413	E1V1M2	B/L Frontal,Lt.Temp cont,#Occipital	Conservative	Positive	Expired on D4
149	Mohana.	49/F	27-0811	13456	E1V2M5	Rt.Frontal EDH,#Rt.Frontal	Rt.Frontal Craniotomy & evac	Negative	E4V5M6 on D12
150	Gomathi.	22/F	28-0811	13481	E2V1M5	Rt.FTP thin SDH,Rt.Temp cont,#L.T&P	Conservative	Negative	E3V4M6 on D16
151	Chinnan	45/M	28-0811	13489	E2V1M5	Rt. FTP Acute SDH,Rt.FP SAH	Conservative	Negative	E3V3M5 on D14
152	Ponnarasan	52/M	29-0811	13523	E2V1M4	Rt.F & T Contusion, Rt. FP SAH, Shift	Rt. FTP DC & Evacuation of cont	Positive	E3VtM5 on D20

153	Arivalan	44/M	30-0811	13564	E1V1M5	Rt. F&T,Lt. T&P Contusion, #Rt.T&P	Conservative	Positive	Expired on D4
154	Jacob	67/M	30-0811	13571	E2V1M4	Lt.FTP Acute SDH with Shift	Lt.FTPDC&EvacuationofSDH	Negative	E3V3M5 on D17
155	Malathy.	23/F	30-0811	13584	E1V1M5	Lt.FTP Acute SDH Lt.FP SAH & Shift	Lt.FTPDC&EvacuationofSDH	Positive	E3V3M5 on D26
156	Kanthasamy	31/M	02-0911	13634	E2V1M5	DAI	Conservative	Negative	E3V4M6OnD13
157	Ram	27/M	02-0911	13642	E1V1M5	Rt. FP EDH & # Rt. Frontal	Rt.FP Craniotomy & evacuation	Negative	E4V5M6 on D12
158	Palavan	54/M	03-0911	13677	E2V1M5	Rt.F & P Contusion,DCE,#Lt.Occipital	Conservative	Positive	E2VtM5onD23
159	Santhanam	58/M	03-0811	13685	E1V1M2	Lt.FTP Acute SDH, Lt.F&P Contusion	Lt.FTPDC&EvacuationofSDH	Positive	Expired on D2
160	Asvini.	37/F	04-0911	13702	E1V1M5	Tentorial bleed,# Occipital	Conservative	Negative	E4V4M6 on D15
161	Vijay	14/M	04-0911	13713	E2V1M5	Lt.Temp contusion,Lt.FT SAH	Conservative	Negative	E3VEM5 on D12
162	Vairavan	38/M	05-0911	13742	E1V1M5	DAI	Conservative	Negative	E4V4M5onD9
163	Kalamuthu	47/M	06-0911	13771	E2V1M4	Lt.Frontal contusion,Lt.FP SAH	Conservative	Positive	E3V3M5 on D17
164	Mookannan	53/M	07-0911	13805	E1V1M2	Lt.FTP SAH,Brain stem cont,Tent ble	Conservative	Positive	Expired on D1
165	Loorthusamy	37/M	07-0911	13821	E1V1M2	Lt.FTP Acute SDH,#RT.Occipital	Lt.FTPDC&EvacuationofSDH	Positive	Expired on D2
166	Binu	28/M	08-0911	13864	E1V2M5	Lt.FTP Acute EDH,# Lt. F&P	Lt.FTP Craniotomy & evacuation	Negative	E4V4M6 on D9
167	Rohit	16/M	09-0911	13897	E2V1M5	DAI	Conservative	Negative	E4V3M5 on D9
168	Vijayalaxmi.	32/F	09-0911	13914	E1V1M4	Lt.Temp contusion,Lt.FT Ac SDH,shift	Lt.FTP DC&Evacuation Cont,SDH	Positive	Expired on D2
169	Punniakodi	42/M	09-0911	13919	E1V1M1	Br.Stem.Cont, DCE	Conservative	Negative	Expired on D1
170	Jeyamkondan	64/M	10-0911	13938	E1V2M5	B/L Frontal Contusion, mass effect+	Bifrontal DC	Positive	Expired on D5
171	Oorvasi.	31/F	11-0911	13962	E1V2M5	Rt. Temp EDH,# Rt .Temp	Rt.Temporal cranio&evacuation	Negative	E4V4M6 on D10
172	Muthalbasha	27/M	11-0911	13976	E1V2M5	Rt.FTP Ac.SDH,#Lt.Temp, shift	Rt. FTP DC & Evacuation of SDH	Positive	E3V4M6 on D15
173	Irulayi.	47/F	11-0911	13983	E1V1M3	Occipital horn IVH, DAI	Conservative	Negative	Expired on D1
174	Harivasan	61/M	13-0911	14089	E1V2M5	B/L Frontal Contusion,Lt.Temp SAH	Conservative	Positive	E3V4M6 on D22
175	Valavan	35/M	13-0911	14095	E2V1M4	Rt,Frontal cont with mass effect +	Rt Frontal DC & Evacuation	Positive	E4V4M6 on D14
176	Kannan	23/M	14-0911	14136	E1V2M5	Rt.FTP Ac.EDH,#Rt.R&T, shift +	Rt. FTP Craniotomy&evacuation	Negative	E4V4M6 on D12
177	Prabakar	36/M	15-0911	14167	E1V2M5	Lt.Temp Contusion	Conservative	Negative	E3V4M6 on D5
178	Uma.	25/F	15-0911	14173	E1V1M5	Lt Frontal EDH,#Lt.Frontal	Lt.Frontal Craniotomy&evac	Negative	E4V5M6 on D12
179	Anadan	47/M	16-0911	14796	E1V1M3	B.Stem,Lt.Fr.Cont,Rt.FDP SDH,#Lt.Te	Conservative	Positive	Expired on D 1
180	Shanmugam	55/M	17-0911	14824	E1V2M5	Lt.FTP Acute SDH, Lt.Temp Contusion	Lt.FTP DC&Evacuation Cont,SDH	Positive	E3V3M5 on D17
181	Veni.	41/F	17-0911	14832	E1V1M5	DAI	Conservative	Negative	E2VtM5onD16
182	Viruthayi.	36/F	18-0911	14867	E1V1M4	Rt.Frontal,Lt.Parietal,Br.Stem Cont	Conservative	Negative	E4VtM5onD19
183	Dhas	23/M	19-0911	14899	E2V1M5	Lt.FP EDH,#Lt.Parietal	Lt.FP craniotomy&evacuation	Negative	E4V4M6 on D12
184	Muniyandi	50/M	19-0911	14910	E1V1M2	Rt.FTP SAH,B.Stem cont,DCE	Conservative	Negative	Expired on D5
185	Pandian	68/M	21-0911	14967	E1V1M5	Lt.FTP Acute SDH,Rt.FP SAH, shift +	Lt.FTP DC&Evacuation of SDH	Negative	E3VtM5onD15
186	Kanaga.	52/F	21-0911	14976	E1V1M5	Lt.Temp cont	Conservative	Positive	E2VtM5onD16
187	Parthasarathy	60/M	21-0911	14988	E1V1M3	BiFrontal cont,Rt.Frontal SDH,#Occi	B/L Frontal DC Evac of SDH,Cont	Positive	Expired on D4
188	Yesammal.	47/F	22-0911	15011	E1V1M3	Rt.F,P cont, CCD # Rt. Frontal	WD,#segment excision	Negative	Expired on D2
189	Shankar	19/M	23-0911	15055	E2V1M5	B.Stem cont,# Rt. Frontal	Conservative	Negative	E3V4M6 on D14
190	Sakravarthy	42/M	23-0911	15067	E1V2M5	Lt.FTP Ac SDH,Lt.Fr.Cont,#Rt.F&P	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D 5

191	Vadivel	55/M	25-0911	15137	E2V1M5	Lt Frontal contusion	Conservative	Negative	E4V4M6 on D9
192	Loganathan	37/M	25-0911	15168	E1V1M5	Tent,Basal cistern bleed,Rt.Parie.Cont	Conservative	Positive	E3VtM5 on D20
193	Sekar	47/M	26-0911	15187	E2V1M5	Rt.Fr.Cont,Rt.FP SAH,#Lt.Occipital	Rt.Frontal Craniotomy & evac	Positive	E3V3M5 on D12
194	Perumalsamy	32/M	27-0911	15224	E1V1M1	Lt. FTP Ac.SDH,Lt.FTP SAH,#Rt.Parie	Conservative	Negative	Expired on D1
195	Maruthamuthu	49/M	27-0911	15236	E1V1M3	Lt.FT Ac SDH,Lt.Temp.Cont,#Lt.F&T	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
196	Sundari.	26/F	27-0911	15241	E1V2M5	Rt.F&P Cont, DCE	Conservative	Positive	E3V3M5 on D19
197	Faziya.	34/F	29-0911	15286	E1V2M5	B/L Occipital Horn IVH	Conservative	Negative	E3V4M5 on D13
198	Noorullah	78/M	30-0911	15312	E1V1M2	B/L Frontal,Lt.Temp cont,#Occipital	Conservative	Positive	Expired on D4
199	Pavai.	49/F	30-0911	15326	E1V2M5	Rt.Frontal EDH,#Rt.Frontal	Rt.Frontal Craniotomy & evac	Negative	E4V5M6 on D12
200	Padma.	22/F	30-0911	15332	E2V1M5	Rt.FTP thin SDH,Rt.Temp cont,#L.T&P	Conservative	Negative	E3V4M6 on D16
201	Deivanayagam	45/M	01-1011	15357	E2V1M5	Rt. FTP Acute SDH,Rt.FP SAH	Conservative	Negative	E3V3M5 on D14
202	Ramanathan	52/M	01-1011	15371	E2V1M4	Rt.F & T Contusion, Rt. FP SAH, Shift	Rt. FTP DC & Evacuation of cont	Positive	E3VtM5 on D20
203	Balamurugan	44/M	02-1011	15399	E1V1M5	Rt. F&T,Lt. T&P Contusion, #Rt.T&P	Conservative	Positive	Expired on D4
204	Xavier	67/M	02-1011	15411	E2V1M4	Lt.FTP Acute SDH with Shift	Lt. FTP DC & Evacuation of SDH	Negative	E3V3M5 on D17
205	Sabitha.	23/F	02-1011	15421	E1V1M5	Lt.FTP Acute SDH Lt.FP SAH & Shift	Lt. FTP DC & Evacuation of SDH	Positive	E3V3M5 on D26
206	Chinnasamy	31/M	03-1011	15455	E2V1M5	DAI	Conservative	Negative	E3V4M6 On D 13
207	Valavan	27/M	04-1011	15487	E1V1M5	Rt. FP EDH & # Rt. Frontal	Rt.FP Craniotomy & evacuation	Negative	E4V5M6 on D12
208	Dharman	54/M	05-1011	15514	E2V1M5	Rt.F& P Contusion,DCE,#Lt.Occipital	Conservative	Positive	E2VtM5 on D23
209	Thirupathy	58/M	05-1011	15531	E1V1M2	Lt.FTP Acute SDH, Lt.F&P Contusion	Lt. FTP DC & Evacuation of SDH	Positive	Expired on D2
210	Kannammal.	37/F	05-1011	15537	E1V1M5	Tentorial bleed,# Occipital	Conservative	Negative	E4V4M6 on D15
211	Zaheer	14/M	07-1011	15597	E2V1M5	Lt.Temp contusion,Lt.FT SAH	Conservative	Negative	E3VEM5 on D12
212	Elango	38/M	07-1011	15622	E1V1M5	DAI	Conservative	Negative	E4V4M5 on D9
213	Theerthavan	47/M	08-1011	15654	E2V1M4	Lt.Frontal contusion,Lt.FP SAH	Conservative	Positive	E3V3M5 on D17
214	Fayazkhan	53/M	09-1011	15692	E1V1M2	Lt.FTP SAH,Brain stem cont,Tent ble	Conservative	Positive	Expired on D1
215	Sengalai	37/M	09-1011	15699	E1V1M2	Lt.FTP Acute SDH,#RT.Occipital	Lt. FTP DC & Evacuation of SDH	Positive	Expired on D2
216	Kaniamuthan	28/M	10-1011	15726	E1V2M5	Lt.FTP Acute EDH,# Lt. F&P	Lt.FTP Craniotomy& evacuation	Negative	E4V4M6 on D9
217	Rajesh	16/M	10-1011	15731	E2V1M5	DAI	Conservative	Negative	E4V3M5 on D9
218	Rajani.	32/F	11-1011	15767	E1V1M4	Lt.Temp contusion,Lt.FT Ac SDH,shift	Lt.FTP DC&Evacuation Cont,SDH	Positive	Expired on D2
219	Lawrance	42/M	12-1011	15789	E1V1M1	Br.Stem.Cont, DCE	Conservative	Negative	Expired on D1
220	Poruran	64/M	12-1011	15795	E1V2M5	B/L Frontal Contusion, mass effect+	Bifrontal DC	Positive	Expired on D5
221	Lavanya.	31/F	12-1011	15799	E1V2M5	Rt. Temp EDH,# Rt .Temp	Rt.Temporal cranio&evacuation	Negative	E4V4M6 on D10
222	Maruthakalai	27/M	13-1011	15841	E1V2M5	Rt.FTP Ac.SDH,#Lt.Temp, shift	Rt. FTP DC & Evacuation of SDH	Positive	E3V4M6 on D15
223	Kiliarasi.	47/F	13-1011	15857	E1V1M3	Occipital horn IVH, DAI	Conservative	Negative	Expired on D8
224	Ottapiran	61/M	14-1011	15887	E1V2M5	B/L Frontal Contusion,Lt.Temp SAH	Conservative	Positive	E3V4M6 on D22
225	Aadavan	35/M	15-1011	15900	E2V1M4	Rt,Frontal cont with mass effect +	Rt Frontal DC & Evacuation	Positive	E4V4M6 on D14
226	Dhanush	23/M	15-1011	15913	E1V2M5	Rt.FTP Ac.EDH,#Rt.R&T, shift +	Rt. FTP Craniotomy&evacuation	Negative	E4V4M6 on D12
227	Bakiasamy	36/M	16-1011	15951	E1V2M5	Lt.Temp Contusion	Conservative	Negative	E3V4M6 on D5
228	Porkodi.	25/F	17-1011	15984	E1V1M5	Lt Frontal EDH,#Lt.Frontal	Lt.Frontal Craniotomy&evac	Negative	E4V5M6 on D12

229	Velliankiri	47/M	17-1011	15996	E1V1M3	B.Stem,Lt.Fr.Cont,Rt.FDP SDH,#Lt.Te	Conservative	Positive	Expired on D1
230	Kollappan	55/M	19-1011	15667	E1V2M5	Lt.FTP Acute SDH, Lt.Temp Contusion	Lt.FTP DC&Evacuation Cont,SDH	Positive	E3V3M5 on D17
231	Sinthu.	41/F	19-1011	15672	E1V1M5	DAI	Conservative	Negative	E2VtM5 on D16
232	Karuthamma.	36/F	19-1011	15687	E1V1M4	Rt.Frontal,Lt.Parietal,Br.Stem Cont	Conservative	Negative	E4VtM5 on D19
233	Rajan	23/M	20-1011	15703	E2V1M5	Lt.FP EDH,#Lt.Parietal	Lt.FP craniotomy&evacuation	Negative	E4V4M6 on D12
234	Machavathan	50/M	20-1011	15719	E1V1M2	Rt.FTP SAH,B.Stem cont,DCE	Conservative	Negative	Expired on D5
235	Megavarman	68/M	21-1011	15748	E1V1M5	Lt.FTP Acute SDH,Rt.FP SAH, shift +	Lt.FTP DC&Evacuation of SDH	Negative	E3VtM5 on D15
236	Gayathri.	52/F	22-1011	15787	E1V1M5	Lt.Temp cont	Conservative	Positive	E2VtM5 on D16
237	Mohan	60/M	22-1011	15799	E1V1M3	BiFrontal cont,Rt.Frontal SDH,#Occi	B/L Frontal DC Evac of SDH,Cont	Positive	Expired on D4
238	Manjula.	47/F	23-1011	15834	E1V1M3	Rt.F,P cont, CCD # Rt. Frontal	WD,#segment excision	Negative	Expired on D2
239	Silamban	19/M	24-1011	15867	E2V1M5	B.Stem cont,#Rt. Frontal	Conservative	Negative	E3V4M6 on D14
240	Kalaivanan	42/M	24-1011	15887	E1V2M5	Lt.FTP Ac SDH,Lt.Fr.Cont,#Rt.F&P	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
241	Prabusoloman	55/M	25-1011	15917	E2V1M5	Lt Frontal contusion	Conservative	Negative	E4V4M6 on D9
242	Periannan	37/M	26-1011	15956	E1V1M5	Tent,Basal cistern bleed,Rt.Parie.Cont	Conservative	Positive	E3VtM5 on D20
243	Chinnakaruppu	47/M	26-1011	15961	E2V1M5	Rt.Fr.Cont,Rt.FP SAH,#Lt.Occipital	Rt.Frontal Craniotomy & evac	Positive	E3V3M5 on D12
244	Janagiraman	32/M	27-1011	15994	E1V1M1	Lt. FTP Ac.SDH,Lt.FTP SAH,#Rt.Parie	Conservative	Negative	Expired on D1
245	Arunachalam	49/M	27-1011	16007	E1V1M3	Lt.FT Ac SDH,Lt.Temp.Cont,#Lt.F&T	Lt.FTP DC&Evacuation SDH,Cont	Positive	Expired on D5
246	Karkuzhali.	26/F	27-1011	16021	E1V2M5	Rt.F&P Cont, DCE	Conservative	Positive	E3V3M5 on D19
247	Selvi	34/F	29-1011	16087	E1V2M5	B/L Occipital Horn IVH	Conservative	Negative	E3V4M5 on D13
248	Mari	78/M	29-1011	16094	E1V1M2	B/L Frontal,Lt.Temp cont,#Occipital	Conservative	Positive	Expired on D4
249	Poornam.	49/F	30-1011	16112	E1V2M5	Rt.Frontal EDH,#Rt.Frontal	Rt.Frontal Craniotomy & evac	Negative	E4V5M6 on D12
250	Nanthini.	22/F	30-1011	16232	E2V1M5	Rt.FTP thin SDH,Rt.Temp cont,#L.T&P	Conservative	Negative	E3V4M6 on D16

A - NAM B - AGE / SEX C - DATE OF ADMISSION D - MIN NUMBER E - GCS

F - DIAGNOSIS G - MANAGEMENT H - COAGULOPATHY I - OUTCOME

APPENDIX

INFORMATION SHEET

We are conducting study on

"COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY"

among patients attending Rajiv Gandhi Government General Hospital, Chennai

and for that your specimen may be valuable to us.

- The purpose of this study is to analyze the coagulation parameters in acute severe head injury patients.
- We are selecting certain cases and if your radiological image is found eligible, we may be using your specimen to perform extra tests and special studies which in any way do not affect your final report or management.
- The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.
- Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.
- The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of investigator Signature of participant

Date:

INFORMED CONSENT FORM

"COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY"

I _____ have read the information in this form (or it has been read to me). I was free to ask any questions and they have been answered. I am over 18 years of age and, exercising my free power of choice, hereby give my consent to be included as a participant in **"COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY"**. I have read and understood this consent form and the information provided to me.

2. I have had the consent document explained to me.

3. I have been explained about the nature of the study.

4. I have been explained about my rights and responsibilities by the investigator.

5. . I am aware that I may need to undergo a CT scan and a blood investigation for this study.

7. I agree that my records can be used for research and study purposes.

8. I am aware of the fact that I can opt out of the study at any time without having to give any reason and this will not affect my future treatment in this hospital. *****

9. I am also aware that the investigator may terminate my participation in the study at any time, for any reason, without my consent. *****

10. I hereby give permission to the investigators to release the information obtained from me as result of participation in this study to the sponsors, regulatory authorities, Govt. agencies, and IEC. I understand that they are publicly presented.

11. I have understand that my identity will be kept confidential if my data are publicly presented

12. I have had my questions answered to my satisfaction.

13. I have decided to be in the research study.

I am aware that if I have any question during this study, I should contact the investigator. By signing this consent form I attest that the information given in this document has been clearly explained to me and understood by me, I will be given a copy of this consent document.

Name _____

Date_____ Signature_____

Name and Signature of impartial witness (required for illiterate patients):

Name _____

Date_____ Signature_____

Name and Signature of the investigator obtaining consent:

Name _____

Date_____ Signature_____

<u>ஆராய்ச்சி ஒப்புதல் கடிதம்</u>

ஆராய்ச்சி தலைப்பு

“COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY”

ராஜீவ் காந்தி அரசு மருத்துவக்கல்லூரி மற்றும் அரசு பொது மருத்துவமனையின் நரம்பியல் அறுவை சிகிச்சைத் துறையில் **“COAGULATION FACTORS STUDY IN ACUTE SEVERE HEAD INJURY”** பற்றிய ஆய்வு நடைபெறுகிறது என்பதை அறிந்து கொண்டேன்

- எனக்கு18 வயது பூர்த்தி அடைந்து விட்டது என்றும் என் சொந்த விருப்பத்தின் பெயரில் இந்த ஆராய்ச்சியில் பங்கு பெறுகிறேன் என்று தெரிவித்து கொள்கிறேன்.
- இந்த ஆராய்ச்சிபற்றி நான் முழுமையாக அறிந்து கொண்டேன் எனக்கு உள்ள உரிமைகள் பற்றி அறிந்து கொண்டேன்.
- இந்த ஆராய்ச்சிக்காக நான் சிடி ஸ்கேன் எடுக்க வேண்டி வரும் என்பதை அறிந்து கொண்டேன்

- சிடி ஸ்கேன், மற்றும் எம்.ஆர்.ஐ ஸ்கேன் ஆகியவற்றின் அடிப்படையில் இந்த ஆய்வு நடைபெறுகிறது என்பதையும் மேலும் அறுவை சிகிச்சையின் போது நேரடியாக பார்க்கப்படுவதை வைத்தும் ஆய்வு நடைபெறுகிறது என்பதையும் அறிந்து கொண்டேன்
- இவ்வாய்வில் கலந்து கொள்பவர்களின் சொந்த தகவல்கள் ரகசியமாக பாதுக்காகபடும் என்பதையும் இந்த ஆய்வின் முடிவுகளை பிரசுரிக்குபோது அல்லது வெளியிடும்போதோ தங்களின் எனது தகவல்கள் ஏதும் வெளியிடபடாது என்பதையும் அறிந்து கொண்டேன்
- இந்த ஆராய்ச்சியிலிருந்து எந்த நேரமும் பின் வாங்கலாம் என்றும், அதனால் எந்த பாதிப்பும் எற்படாது என்பதையும் அறிந்து கொண்டேன்
- இந்த ஆய்வில் பங்குபெற அல்லது விலகிக்கொள்ள எனக்கு முழு சுதந்திரம் உண்டு என்பதையும், இந்த ஆய்வில் இருந்து நான் விலகிகொண்டாலும் எனக்கு கிடைக்கவேண்டிய சிகிச்சை தொடர்ந்து கிடைக்கும் என்பதையும் அறிந்து கொண்டேன்
- இந்த ஆராய்ச்சியின் விவரங்களும், அதன் நோக்கங்களும் எனக்கு தெளிவாக விளக்கப்பட்டது. எனக்கு விளக்கப்பட்ட விவரங்களை புரிந்து கொண்டு, இந்த ஆய்வில் கலந்து கொள்ள சம்மதிக்கிறேன்
- இந்த ஆராய்ச்சியில் பிறரின் நிர்பந்தமின்றி என் சொந்த விருப்பத்தின் பேரில் தான் பங்கு பெறுகிறேன்

----------கையொப்பம்

தேதி ---------- ----------பெயர்

----------சாட்சி கையொப்பம்

தேதி ---------- ----------பெயர்

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr.C.Kathirvel
PG in Neurosurgery
Madras Medical College,Chennai -3

Dear Dr.C.Kathirvel,

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled " Coagulation factors study in acute severe head injury" No.18112012.

The following members of Ethics Committee were present in the meeting held on 01.11.2012 conducted at Madras Medical College, Chennai -3.

1. Prof. R. Nandhini MD -- Member Secretary
   Director, Instt. of Pharmacology ,MMC, Ch-3
2. Prof. Reghu MD -- Member
   Director , Inst. Of Internal Medicine, MMC, Ch-3
3. Prof. Shyamraj MD -- Member
   Director i/c , Instt. of Biochemistry , MMC, Ch-3
4. Prof. P. Karkuzhali. MD -- Member
   Prof., Instt. of Pathology, MMC, Ch-3
5. Prof. G.Muralidharan MS -- Member
   Prof of Surgery, MMC, Ch-3
6. Thiru. S. Govindsamy. BA, BL -- Lawyer

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

19/11/12
Member Secretary, Ethics Committee

Turnitin Originality Report

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